Appendix B: Land Use Scenarios Technical Report

Land Use Scenarios Technical Report

I-93 Exit 4A Supplemental Draft Environmental Impact Statement

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ABBREVIATIONS AND ACRONYMS

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EIS	environmental impact statement
2007 DEIS	2007 Draft Environmental Impact Statement
FHWA	Federal Highway Administration
gsf	gross square feet
NEPA	National Environmental Policy Act
NHDOT	New Hampshire Department of Transportation
NHES	New Hampshire Employment Security
OEP	New Hampshire Office of Energy and Planning
Project	I-93 Exit 4A Project
PUD	planned unit development
RPC	Rockingham Planning Commission
SDEIS	Supplemental Draft Environmental Impact Statement
SNHPC	Southern New Hampshire Planning Commission
TAZ	traffic analysis zone

1.0 INTRODUCTION

The Towns of Derry and Londonderry and the New Hampshire Department of Transportation (NHDOT), in cooperation with the Federal Highway Administration (FHWA), are preparing a Supplemental Draft Environmental Impact Statement (SDEIS) for the I-93 Exit 4A Project (Project). The Proposed Project consists of a new diamond interchange on I-93 in the Town of Londonderry, approximately 1 mile north of Exit 4. The new diamond interchange would provide access to the east side of I-93. A 1-mile connector roadway would be built on new alignment from the interchange to Folsom Road, near the intersection of North High Street and Madden Road, in the Town of Derry. Folsom Road, and subsequently Tsienneto Road, would be upgraded, and the intersections would be improved. In total, the Proposed Project corridor from I-93 to the intersection of Tsienneto Road and NH Route 102/Chester Road would be 3.2 miles. The purpose of the Project is to reduce congestion and improve safety along NH 102, from I-93 east through downtown Derry and to promote economic vitality in the Derry/Londonderry area.

As part of the SDEIS, the Southern New Hampshire Planning Commission's (SNHPC's) regional travel demand model will be used to assess how the Project and alternatives may affect travel patterns in the 2040 design year. The travel demand model requires information on local-level population and employment patterns to forecast the number of trip origin and end points in the future. In addition to estimating the number of trips, type of trips, and destination of trips, the travel demand model includes a representation of the roadway network (including highway capacity and speed). The travel demand model assigns trips to specific routes, which forms the basis for the total traffic volumes forecasted for each roadway. Separate model runs are required to represent the 2040 roadway network without the Project (e.g., the 2040 No Build) and with the Project completed (2040 Build). The travel demand model output of volumes for each roadway link in the network on a 24-hour basis will be further processed as part of a detailed traffic impact analysis for the peak hours. The traffic impact analysis will be documented in the SDEIS traffic and transportation technical report and will in turn inform several other SDEIS technical analyses, including air quality and noise.

The purpose of this report is to document the basis for the local level population and employment inputs used in the travel demand modeling for the 2040 No Build and Build conditions. Given that the purpose of the Project includes encouraging economic development in Londonderry and Derry, a critical objective for the SDEIS is to estimate the quantity and location of potential future development potentially caused by the Project and to account for that growth in the travel demand modeling. As a result of including potential induced growth impacts in the travel demand model for the 2040 Build condition, the SDEIS will ensure consistency between the traffic analysis and the other land use-related portions of the SDEIS, including indirect and cumulative impacts. The overall land use forecasting process used is consistent with the recommendations of FHWA's *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA* (FHWA, 2010). Specifically, the forecasting effort included reviewing the suitability of existing forecasts; collaborating with land use/socioeconomic forecast experts, local planners, and the development community; and documenting the basis for assumptions.

1.1 Regulatory Framework

The Council on Environmental Quality (CEQ) regulates implementation the National Environmental Policy Act (NEPA) and defines three types of effects: direct, indirect, and cumulative.

"**Direct impacts** are caused by the action and occur at the same time and place (40 Code of Federal Regulations [CFR] 1508.8)." Examples of direct impacts include displacements resulting from the acquisition of right-of-way or the fill placed in wetlands in order to construct a roadway improvement. The uncertainty associated with assessing direct impacts is very low relative to indirect and cumulative impacts.

"**Indirect effects** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8)."

The National Cooperative Highway Research Program Report 403: *Estimating the Indirect Effects of Proposed Transportation Projects* identifies three types of indirect effects:

- Encroachment-Alteration Effects - alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, chemical, or biological) on the environment.
- Induced Growth Effects - changes in the intensity of the use to which land is put that are caused by the action/project. These changes would not occur if the action/project does not occur. For transportation projects, induced growth is attributed to changes in accessibility caused by the project.
- Induced Growth Related Effects - alteration of the behavior and functioning of the affected environment attributable to induced growth.

"**Cumulative impact** is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7)." According to FHWA's *Interim Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*, cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and will likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a proposed project (FHWA, 2003).

1.1.1 FHWA Interim Guidance on Travel and Land Use Forecasting

In 2010, FHWA issued *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA*. Among other items, the guidance identifies considerations for improving how project-level forecasting is applied in the context of the process for meeting the requirements of NEPA and related project development. The interim guidance outlines the following key procedural and process considerations for land use and travel forecasting for NEPA:

Access project conditions and scope the forecasting needs of the study: It is crucial to scope and forecasting effort to meet the project analysis, decision-maker and stakeholder needs in the study area. For this reason, it is useful to begin the forecasting process by understanding the requirements of the study and anticipating the decision-maker and stakeholder interests with respect to forecasting.

Review the suitability of modeling methods, tools, and underlying data: It is important that the study team review the suitability of available modeling methods and the underlying data, including consideration of the currency and quality of the model data and methods, and that they analyze the data and methods' ability to adequately examine alternatives.

Conduct scoping and collaborate on methodologies: Scoping is a collaborative process involving the lead agencies, resource and regulatory agencies, and the public and is typically how a NEPA study begins. It is critical for the study team to document the broad agreements reached during scoping on the assumptions to be used for the land use and travel forecasting.

Objective application of forecasting in alternatives analysis: The requirement for the alternatives analysis to be an objective evaluation makes it essential for the study team to apply forecasting data and methods objectively without any bias towards a particular alternative. Important considerations include understanding uncertainty in assumptions and forecasts and how induced demand and land development effects are taken into account.

Project management considerations: NEPA studies are often complex undertakings and may be accompanied by various special considerations that warrant extra attention, such as the potential for re-do analysis loops and ensuring documentation consistency.

Forecasting for noise and air emissions analyses: Land use and travel demand forecasting models are used to provide inputs to noise and air quality assessments. It is important that assumptions that are made in general forecasting applications as part of the NEPA study are consistent with those used in the noise and air quality analyses.

Documentation and archiving: It is important for NEPA documentation to include enough technical detail to explain complex information in an understandable manner, and to describe how analytical methods were chosen, what assumptions were made, and who made those choices. (FHWA, 2010)

1.2 Relationship to Other Technical Reports

Within the overall regulatory framework discussed in section 1.1, the focus of this report is the portion of indirect effects related to land use change/induced growth, as well as cumulative impacts on population and employment levels. The potential indirect environmental impacts of the land use changes discussed in this report (such as additional habitat loss or additional stormwater runoff for example) will be documented separately in the SDEIS Indirect Effects Technical Report. The SDEIS and Indirect Effects Technical Report will also address encroachment-alteration type effects, such as habitat fragmentation. Similarly, cumulative

impacts on specific environmental resources will be thoroughly documented through a separate Cumulative Impacts Technical Report and in the SDEIS. However, the subsequent further indirect and cumulative impact analyses will utilize the population and employment levels and growth patterns identified in this report as a key input.

The travel demand modeling and traffic impact analyses will utilize the socioeconomic data results of this study as an input, but the details of these analyses will be documented separately in the Traffic and Transportation Technical Report.

2.0 METHODOLOGY

The methodology used to develop the 2040 No Build and Build conditions land use forecasts included obtaining existing population and employment forecasts and interviewing local land use planners, socioeconomic data experts, and representatives of the development community.

2.1.1 Study Area

The study area for the Build and No Build conditions is the "economic study area" described in the 2007 Draft EIS (DEIS), as shown in Figure 1. This study area encompasses 143 square miles within the two Towns of Derry and Londonderry, as well as Auburn, Chester, and Sandown. The five-town study area was determined by considering the likely geographic extent of potential direct, indirect, and cumulative effects related to land use and development—Derry and Londonderry would be directly affected, and Auburn, Chester, and Sandown may experience indirect effects due to improved access and travel time to I-93. The limits of the economic study area were agreed upon in consultation with state and federal agency staff at a meeting held on August 25, 2005. Given that there are no major changes in the basic alignment of the alternatives under consideration since the 2007 DEIS, the previously agreed on study area remains reasonable for this SDEIS.

2.1.2 Analysis Timeframe

The temporal scope of analysis for the land use scenarios is based on past development trends and a future-planning horizon for which information on reasonably foreseeable future development is available. The Towns of Derry and Londonderry experienced rapid growth beginning in the 1960s and 1980s, respectively, based on available and affordable housing and favorable schools. Londonderry adopted a growth management ordinance (a subset of its zoning ordinance) in 1988 and readopted it in 1998. The ordinance was allowed to expire in 2015. Derry adopted a growth management ordinance (also a subset of its zoning ordinance) in 1999, which is still active. As a result, the past time horizon for consideration of development trends is 1990, the point at which the rapid growth began to be controlled (see section 3.1 – Past Population and Employment Trends). The future time horizon is 2040, which is the design year for the Project as well as a time horizon that encompasses the long-range comprehensive plans and long-range transportation plans for the study area. The 2040 future analysis year is also the analysis year that will be used for the transportation and air quality/noise impact analyses for the Project. The baseline or existing conditions model year for the transportation analyses for the Project is 2015, consequently 2015 land use and socioeconomic data is also reviewed in this report.

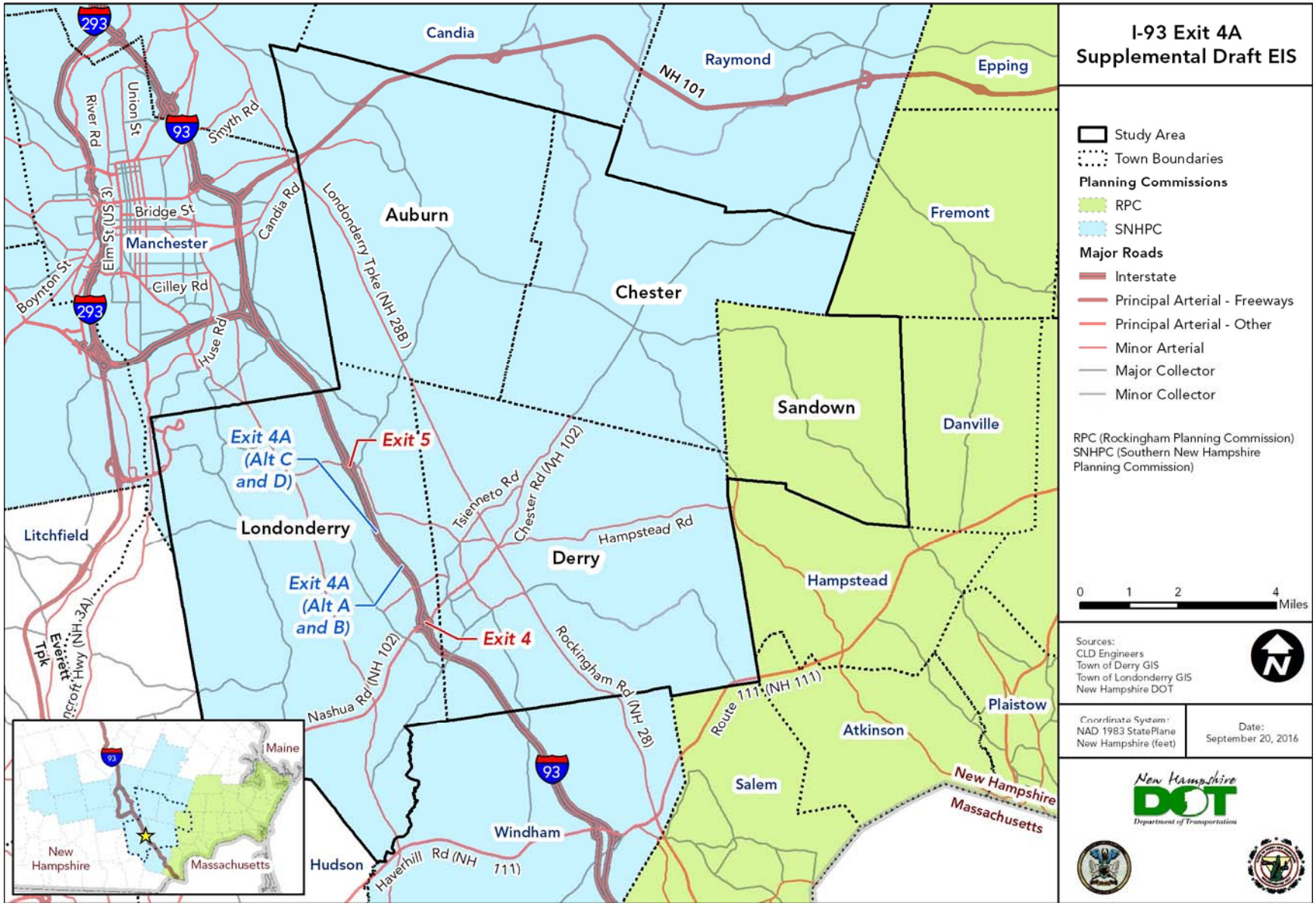

Figure 1. Study area

2.2 Data Reviewed

Existing population and employment forecasts, comprehensive plans, and available development data were reviewed, including the following:

- U.S. Census Bureau 1990, 2000, and 2010 Decennial Census data (U.S. Census Bureau, 1990, 2000, and 2010)
- New Hampshire Employment Security (NHES) Economic and Labor Market Information Bureau employment data from 2004 and 2014 (NHES, 2015)
- New Hampshire Office of Energy and Planning (OEP) County and Municipal Populations Projections 2010–2040 (OEP, 2016a, 2016b)
- SNHPC's Moving Southern New Hampshire Forward: 2015-2035 Regional Comprehensive Plan (SNHPC, 2014) and letter to the Director of Derry Planning Department regarding population and dwelling unit projections (SNHPC, 2012a)
- SNHPC Population and Household Projections 2010-2050 (SNHPC, 2012b), and updated 2015-2040 Household Projections based on OEP Population Projections (SNHPC, 2016a)
- SNHPC Employment Projections for 2010-2050 based on New Hampshire Employment Security and NHDOT data (SNHPC, 2012c), SNHPC Updated Employment Estimates for 2015 (SNHPC, 2016b), and SNHPC Updated Employment Projections for 2020-2040 (SNHPC, 2016c)
- Rockingham Planning Commission (RPC) 2015 Regional Master Plan (RPC, 2015)
- Woodmont Commons Planned Unit Development (PUD) Application Materials (Pillsbury Realty Development, 2013)
- Master Plans of Derry and Londonderry (Town of Derry, 2010; Town of Londonderry, 2013)
- Master Plans of Chester, Auburn, and Sandown (Chester Planning Board, 2015; SNHPC, 2007; Sandown Master Plan Steering Committee et al., 2013)
- SNHPC Regional Comprehensive Plan (SNHPC, 2010)
- Regional Economic Development Center of Southern New Hampshire 2016 Comprehensive Economic Development Strategy (REDC, 2016)
- Environmental constraints on development, and local land use controls

2.3 Land Use Interviews

The purpose of these structured interviews and outreach was to inform and support the analysis of reasonably foreseeable future growth, identify predicted future growth areas under the No Build and Build conditions, and estimate the indirect land use effects of the Project and alternatives.

In conjunction with the information gathered through the interviews, the data detailed in section 2.2 were reviewed to develop the forecasts associated with the 2040 No Build and Build conditions.

Interviews were conducted with the following planners and town staff on July 25–26, 2016:

- Town of Derry
  - George Sioras, Planning Director
  - Elizabeth Robidoux, Planning Assistant
  - Mike Fowler, Public Works Director
- Town of Londonderry
  - Colleen Mailloux, Town Planner
  - John Vogl, GIS Manager/Comprehensive Planner
- SNHPC
  - Julie Chen, Senior Transportation Planner
  - Jack Munn, Chief Planner
  - Adam Hlasny, Transportation Planner
- OEP
  - Ken Gallager, Principal Planner

In addition, because the Woodmont Commons Project is planned adjacent to Exit 4A, Ari Pollack, the developer's representative, was interviewed. Finally, to gather information from municipalities identified in the economic/secondary impacts study area in the 2007 DEIS (i.e., Auburn, Chester, and Sandown), the following people were contacted via telephone.

- Bill Herman, Town Administrator, Auburn
- Andrew Hadik, Planning Coordinator, Chester; Dick Trask, Vice Chair, Chester Board of Selectmen
- Mark Traeger, Planning Board Member, Sandown

Materials, including maps and interview summaries, used to gather information via in-person and telephone interviews are included in Appendix A.

2.4 Uncertainty/Limitations

As with any attempt to forecast future growth or development, there are limitations to the accuracy and certainty of the results of the land use forecasts. This uncertainty is impossible to quantify given that land use change occurs as result of numerous individual private land use decisions and other factors such as global and local economic conditions, housing trends and costs, availability of public water and sewer service, fuel prices and long-term technological changes. The 2040 No Build and Build conditions were developed through consideration of the latest available population and employment projections from state and regional agencies as well as input from planners and others knowledgeable of local conditions and trends. The forecasting process was consistent with the best practices recommended in FHWA's interim guidance on travel and land use forecasting. As a result, the land use forecasts provide a reasonable basis for comparing alternatives in the SDEIS and assessing potential indirect and cumulative impacts as required by CEQ's NEPA regulations. The land use forecasts also provide a logical construct and ensure that the SDEIS evaluation of transportation and land use impacts is consistent.

The No Build and Build land use forecasts developed as a result of this analysis should be considered as possible outcomes, and the addition and/or shift in type of development anticipated with the proposed Project should be considered as trends rather than absolute predictions that a certain number of residential units or gross square feet of commercial or industrial development will occur in any specific location. Ultimately, the development that occurs within the study area under the No Build and Build conditions will be based upon what the Towns will permit and what the market can support.

3.0 POPULATION, HOUSEHOLD, AND EMPLOYMENT PROJECTIONS

The purpose of this section is to provide an overview of the existing population, household, and employment estimates and projections available for the study area.

3.1 Past Population, Household, and Employment Trends

In mid to late 1990s, the towns in the study area implemented growth management strategies to control the substantial population growth and residential development. As Table 1 shows, between 1990 and 2000, the towns experienced average annual population increases between 1.37 percent (Auburn) and 3.49 percent (Chester), with an average annual increase of 1.64 percent across the study area. Between 2000 and 2010, the rate of population growth slowed in the study area for various reasons, including growth management ordinances and the economic downturn in 2007-2008. Chester and Sandown still experienced substantial population growth, increasing by an average annual rate of 2.32 percent and 1.53 percent, respectively. Auburn and Londonderry experienced a much lower rate of population growth, with annual average increases of 0.53 percent and 0.38 percent. During the same 2000 to 2010 timeframe, Derry's population decreased by an annual average rate of 0.27 percent.

Household data for 1990, 2000, and 2010 reveal that Chester and Sandown had the highest average annual household growth rates between 1990 and 2000 as well as between 2000 and 2010. Between 1990 and 2000, the average annual growth rates in Chester and Sandown were 3.48 percent and 2.65 percent, respectively. Between 2000 and 2010, the average annual growth rates in Chester and Sandown were 2.37 percent and 2.03 percent, respectively. The smallest household growth occurred in Derry with an average annual household growth rate of 1.36 percent between 1990 and 2000 and 0.17 percent between 2000 and 2010. Table 1 presents available household data.

Employment information in the form of number of jobs in each jurisdiction was not available for 1990 or 2000. SNHPC's 2010 employment data were calculated from NHES employer database and are presented in Table 2 along with NHES data provided in the community profiles of each jurisdiction (SNHPC, 2012c; NHES, 2015). Sandown is included in the RPC area, and its employment in 2010 as recorded in the RPC 2015 Master Plan is 399 (RPC, 2015). Overall, the data shows very limited growth in employment in the study area since 2004, with some jurisdictions showing declines. The largest growth in jobs occurred in Auburn (550 jobs added between 2004 and 2014).

Table 1. Population and households 1990-2010

Municipality	1990		2000		2010		Average Annual Population Growth Rate		Average Annual Household Growth Rate	
	Population	Households	Population	Households	Population	Households	1990-2000	2000-2010	1990-2000	2000-2010
Derry	29,603	10,767	34,021	12,327	33,109	12,537	1.40%	-0.27%	1.36%	0.17%
Londonderry	19,781	6,386	23,236	7,623	24,129	8,438	1.62%	0.38%	1.79%	1.02%
Auburn	4,085	1,302	4,682	1,580	4,953	1,765	1.37%	0.56%	1.95%	1.11%
Chester	2,691	862	3,792	1,214	4,768	1,534	3.49%	2.32%	3.48%	2.37%
Sandown	4,060	1,304	5,143	1,694	5,986	2,072	2.39%	1.53%	2.65%	2.03%
Study Area Total	60,220	20,621	70,874	24,438	72,945	26,346	1.64%	0.29%	1.71%	0.75%

Source: U.S. Census Bureau (1990, 2000, 2010); NHGIS, 1990
Note: 1990 household data not readily available for the towns in the study area.

Table 2. Past employment (number of jobs) by municipality

Municipality	2004 (NHES)	2010 (SNHPC/RPC)	2014 (NHES)
Derry	8,150	7,825	8,003
Londonderry	13,240	13,624	13,094
Auburn	1,186	1,651	1,736
Chester	437	528	347
Sandown[a]	244	399	268
Study Area Total	22,257	22,551[a]	23,448

Source: SNHPC (2012c), NHES (2015), RPC (2015)
[a] 2010 Sandown employment data are from the RPC 2015 Master Plan.

3.2 New Hampshire Office of Energy and Planning

OEP provides population projections for the state, counties, and municipalities. The latest projections were generated in 2016 (Table 3) (OEP, 2016a). OEP data show a slight decline in population in Derry between 2015 and 2025 and that Chester, Sandown, and Auburn are projected to be the fastest growing communities in terms of annual average growth rates (0.65 percent, 0.59 percent, and 0.52 percent, respectively). These 2016 projections reflect OEP's 2015 population estimates and the change in migration of populations within the state. According to the interview with OEP, the previous 2013 vital statistics/trends have not changed, but migration to southern New Hampshire is greater than anticipated at the time of the previous 2013 OEP projections, while migration to the northern and western portions of the state is less than anticipated.

The 2016 projections are based on the same methods used to generate the population projections outlined in the 2013 report (OEP, 2013) (i.e., cohort projections, Internal Revenue Service data, and migration rates). OEP worked with the regional planning commissions and conducted a meeting with them on June 20, 2016, to reach consensus on the migration rates to be used in the population projections. The group agreed to use 2000–2005 migration rates, reflecting a moderate growth outlook that is more positive than the outlook from the late 2000s, but not as robust as that of the 1990s. For Rockingham County, the 2000-2005 migration rate was 2.9%, compared to a 0% migration rate between 1990-1995 and a 6.3% migration rate between 1995-2000.

To allocate county-level population projections to towns, OEP reviewed each town's share of the total population and how that share has changed between 2000, 2010, and 2015. OEP assumed that the current trend in each town would continue: faster growing towns would experience more rapid growth than the county average, and slower growing towns would experience less growth.

The population decline between 2035 and 2040 is based on the aging population of the state. For example, Derry experienced a population loss of approximately 1,000 people between the 2000 and 2010 census; however, the population losses in the younger cohorts were greater.

Although OEP does not typically consider individual projects in its projections, the widening of I-93 was included based on the direct connection between the population and employment centers of Boston and Manchester. Appendix C of the SEIS for the I-93 widening project provides more detailed information regarding the OEP's inclusion of the build alternative for the I-93 widening project (8-lanes from Boston to Manchester) in its population projections.

Projects such as the I-93 Exit 4A Project that are not expected to have a large regional effect are not considered in OEP's projection process. As a result, during the interview, OEP agreed that its projections best represent a "No Build" condition for the Project because the OEP projections do not include growth that would potentially be caused by the I-93 Exit 4A Project. Large-scale planned developments, such as Woodmont Commons, are similarly not included in the OEP population projections.

3.3 Southern New Hampshire Planning Commission

SNHPC develops whole-town and zonal (traffic analysis zone [TAZ]) population, household, and employment projections for the towns within its region for purposes of coordinated regional and local planning. Because SNHPC is also the official Metropolitan Planning Organization of

the region, its future projections are also used in the travel demand modeling for the regional long-range transportation plan.

3.3.1 Population and Household Projections

SNHPC prepared population projections covering 2010 through 2050 in 2012. Therefore, the more recent OEP population projections were used by SNHPC at the municipal level for this report (2016a). Based on additional input from the Town of Chester (Appendix A), the population projections were updated for SNHPC's use. The revised numbers were based on the number of building permits issued since 2014 and the anticipated development proposals to subdivide large tracts of land. Table 4 presents the revised population projections for the Town of Chester. Additional details on the assumptions used in the revised projections for Chester are provided in Appendix A. SNHPC estimated the number of households at the town level based on the OEP population projections and the revised Town of Chester population projections (Tables 3 and 4). SNHPC's 2016 whole-town household projections for municipalities in the Project's study area are included in Table 5 (SNHPC, 2016a). To distribute population changes to TAZ, SNHPC dwelling unit projections adjusted based on 2015 dwelling unit estimates were used. Appendix B contains the 2015-2040 TAZ-level estimates for population and households and the memoranda outlining the technical methodology used by SNHPC to develop the model inputs.

Because Sandown is located in the RPC area and not the SNHPC area, information on Sandown households was derived from the RPC 2015 Master Plan (RPC, 2015). The number of Sandown households in 2010 is estimated to be 2,072. Future household projections for Sandown were only available for 2040 and were based on a scenario planning exercise by RPC to explore ways the region might grow. The Exit 4A Project was not considered by RPC in the scenario analysis. The "strong, dispersed growth" scenario is used in this report for Sandown's 2040 household projections because the report uses this scenario for employment projections (see section 3.3.3). The "strong, dispersed growth" scenario projects 2,914 households in Sandown in 2040. For comparison, the "slow growth" scenario projects 2,448 households and the "strong, concentrated growth" projects 2,325 households. Because household numbers between 2010 and 2040 were not available, Table 4 assumes straight-line growth between 2010 and 2040.

3.3.2 Employment Projections

SNHPC also makes TAZ-level projections for employment based on quarterly employment averages from NHES that it compares to building permit data to estimate the number of jobs per square foot of non-residential development. The method used by SNHPC to generate updated TAZ-level projections is detailed in memoranda provided in Appendix B.

Table 6 includes updated 2015 projections based on state data that were adjusted to reflect the fact that SNHPC's 2010 employment information calculated directly from the employer database is slightly higher than the state data. Table 6 then uses the 5-year percent increases from SNHPC's 2012 employment projections to recalculate projections for 2020 through 2040 using the updated 2015 projections. Appendix B includes a memorandum outlining the methodology used to project employment. The notable decline in Chester employment in 2015 is due to the closing of Chester College in 2012, while the rebound in employment in 2020 is projected based on the proposed opening of a Chinese School at the old Chester College (Jaschik, 2012; Williams, 2015). This dip in Chester employment values creates an elevated average annual

growth rate for the town for years 2015-2040 (2.21 percent); for comparison, the average annual growth rate from 2010-2040 was 0.62 percent.

Appendix C includes a sensitivity analysis of the 2040 SNHPC employment projections. The evaluation included the review of historical data from Woods & Poole, a firm specializing in county-level economic projections. Employment data from Woods & Poole measure the number of full- and part-time jobs by location of work (rather than location of residence) (U.S. Census Bureau, 2016a). In addition, population growth from the U.S. Census Bureau for 2003-2014, the time range for which town-level data were available, was reviewed (U.S. Census Bureau, 2016b; 2016c). Based on the evaluation, SNHPC's projection for average annual employment growth of 1.04 percent[1] for the study area for 2015 through 2040 is similar to the Woods & Poole's projection for employment growth in Rockingham County (1.07 percent). In addition, regression models were developed from the 2003-2014 Census data to investigate the relationships between growth rates in employment in the study area, population in the study area, employment in Rockingham County, and employment in New Hampshire. Two models were found to have the most predictive power: one relating study area employment to county-level employment, and a second relating it to county-level employment and study area population. Both regression models suggest study area employment growth rates that are comparable to the rate of growth implied by the SNHPC projection.

The employment sensitivity analysis shows that the SNHPC employment projection is consistent with the OEP population projection based on the historic relationship between population and employment in the region. Since the OEP population projection is considered to represent the future condition with the widening of I-93 to four-lanes in each direction (see section 3.2), the SNHPC employment projections is also considered to include the potential land use impacts of the I-93 widening. As noted previously, neither the OEP nor the SNHPC projections considered the Exit 4A project. Therefore, it is appropriate to use the OEP and SNHPC projections as the basis for the No Build condition for this project (since the widening of I-93 would occur with or without the completion of Exit 4A).

Like household data, information on Sandown employment was derived from the RPC 2015 Master Plan (RPC, 2015). Similar to household data, future employment projections for Sandown were only available for 2040 and were based on various possible future scenarios. The "strong, dispersed growth" scenario is used in this report because it is based directly on the NHES employment projections, which is similar to the methodology used for the employment projections developed by SNHPC. The "strong, dispersed growth" scenario projects 536 jobs in Sandown in 2040. For comparison, the "slow growth" scenario projects 390 jobs, and the "strong, concentrated growth" projects 446 jobs. Because employment numbers between 2010 and 2040 were not available, Table 6 assumes straight-line growth between 2010 and 2040.

[1] The average annual growth rate for the study area is 1.04 percent regardless of whether Sandown is included.

Table 3. OEP 2016 population projection by municipality for 2015–2040

Municipality	2015[a]	2020	2025	2030	2035	2040	Average Annual Growth Rate 2015–2040
Derry	32,948	32,459	32,018	32,733	33,144	33,222	0.03%
Londonderry	24,891	25,434	26,057	26,639	26,973	27,036	0.33%
Auburn	5,315	5,560	5,828	5,959	6,033	6,048	0.52%
Chester	4,887	5,199	5,536	5,660	5,731	5,744	0.65%
Sandown	6,255	6,604	6,984	7,140	7,229	7,246	0.59%
Study Area Total	74,296	75,256	76,423	78,131	79,110	79,296	0.26%
Rockingham County	300,569	307,013	314,418	321,441	325,474	326,238	0.33%

Source: OEP (2016a)
[a] 2015 data are an estimate.

Table 4. Revised Chester population projection for 2015–2040

Municipality	2015[a]	2020	2025	2030	2035	2040	Average Annual Growth Rate 2015–2040
Chester	4,887	5,457	6,027	6,101	6,177	6,253	0.99%

Source: Town of Chester (Appendix A)
[a] 2015 data are the estimate provided by OEP.

Table 5. SNHPC and RPC household projections

Municipality	2010[a]	2015[b]	2020	2025	2030	2035	2040	Average Annual Growth Rate 2015–2040
Derry	12,537	12,656	12,436	12,236	12,496	12,645	12,673	0.01%
Londonderry	8,438	8,628	8,812	9,022	9,219	9,332	9,353	0.32%
Auburn	1,765	1,923	2,012	2,108	2,156	2,182	2,188	0.52%
Chester	1,534	1,621	1,811	2,001	2,026	2,051	2,077	0.99%
Sandown[c]	2,072	2,193	2,321	2,457	2,601	2,753	2,914	1.14%
Study Area Total	26,346	27,021	27,392	27,825	28,497	28,963	29,205	0.31%

Source: SNHPC (2016a; 2017), RPC (2015)

[a] 2010 households were provided by SNHPC and based on U.S. Census information.

[b] 2015 data are an estimate.

[c] Data are from the RPC 2015 Regional Master Plan, with 2040 projections based on the "strong, dispersed growth" scenario. Household data were not available for 2015-2035; therefore, this table includes straight-line growth between 2010 and 2040.

Table 6. SNHPC and RPC employment projections (number of jobs)

Municipality	2010	2015	2020	2025	2030	2035	2040	Average Annual Growth Rate 2015–2040
Derry	7,825	8,384	8,373	8,785	9,254	9,760	10,322	0.84%
Londonderry	13,624	13,517	14,008	14,961	16,000	16,751	17,550	1.05%
Auburn	1,651	1,846	1,960	2,135	2,331	2,534	2,760	1.62%
Chester[a]	528	368	418	459	506	565	635	2.21%
Sandown[b]	399	419	440	463	486	510	536	0.99%
Study Area Total	24,027	24,534	25,199	26,803	28,576	30,121	31,802	1.04%

Source: SNHPC (2012c, 2016b, 2016c), RPC (2015)

Notes: 2010 values were developed in 2012. 2015 projections were updated in 2016. 2020 through 2040 projections were then adjusted to reflect the 2012 5-year projection increases based on the updated 2015 projections.

[a] The notable decline in Chester employment in 2015 is due to the closing of Chester College in 2012, while the rebound in employment in 2020 is projected based on the proposed opening of a Chinese School at the old Chester College (Jaschik, 2012; Williams, 2015). For reference, average annual growth rate in Chester between 2010 and 2040 is 0.65% compared to the elevated 2.24% shown in the table.

[b] Data from the RPC 2015 Regional Master Plan, with 2040 projections based on the "strong, dispersed growth" scenario. Employment data were not available for 2015-2035; therefore, this table includes straight-line growth between 2010 and 2040.

4.0 INTERVIEW SUMMARIES

Interviews with local land use planners assisted with the development of the No Build and Build land use forecasts by identifying development trends in their respective towns and providing spatial and temporal information on planned and proposed developments. The following summaries of development trends are based on these interviews. More detailed summaries of these interviews are provided in Appendix A. The draft interview summaries were provided to all participants for review and comment, and the final interview summaries were approved by the participants.

4.1 Derry

Since 1990, the rapid growth that Derry experienced from the 1960s through the 1980s has slowed. Derry's growth management ordinance was instituted in the mid-1990s along with changes in zoning to control density of residential development. In addition, the segmented ownership in the central business district and lack of large parcels of available land for development make substantial future growth impracticable. Currently, Derry is experiencing a trend of population decline related to an aging population and an outward migration of young adults as they seek employment and educational opportunities elsewhere.

The area immediately to the east of I-93, along Folsom Road north of North High Street, has been rezoned to encourage higher quality industrial and commercial development near the proposed Project. Additionally, residential areas south of Folsom Road and North High Street might be re-zoned to Industrial/Commercial zoning. The Derry planning staff indicated that the Project could have an effect on the timing and intensity of development/redevelopment in this small industrial-zoned area. Effects on commercial/industrial development in other areas of the town are not anticipated. The commercial zoning district along the southern end of Rockingham Road (Route 28) was revised in 2013, and some commercial development has occurred in that area. In addition, water and sewer services are being expanded along Rockingham Road to continue to encourage commercial development along that corridor.

Although no large parcels are suitable for large-scale developments, a 13-unit market-rate apartment building is planned near the central business district. An area along South Main Street/Rockingham Road is zoned for commercial development, and the town is extending water and sewer service to allow the area to develop at a higher density.

The limits of water and sewer service, the lack of large parcels, and the topography in the eastern portion of Derry serve to limit development. Lot size requirements and conserved land are also factors constraining any major single-family home developments in Derry. Because of the large number of development constraints, Derry planning staff suggested that the Project would be unlikely to induce additional residential development in Derry. However, the Project would encourage areas recently rezoned as industrial and commercial to develop by providing direct access to I-93.

4.2 Londonderry

Since 2000, the rapid growth experienced in the 1980s and 1990s has slowed, and the current development trends are based on access to undeveloped or underdeveloped land and the presence or absence of municipal services (water/sewer), which affects the density of development. For

example, the industrial development on Pettengill Road is driven by undeveloped land with access to Raymond Wieczorek Drive (Manchester Airport Access Road). The Project would not affect this industrial development in northwest Londonderry. While a few parcels are available in west Londonderry, the proposed Project would not likely affect their future development because the Project would provide access only to the east of I-93.

On the east side of I-93, the Project would affect the timing and type of growth in Londonderry—the interchange and connector road would provide access and opportunity for commercial, institutional, and higher density residential development.

Woodmont Commons is a planned mixed-use urban village in the Town of Londonderry. The developer, Pillsbury Realty Development, LLC, owns approximately 630 acres bordering the east and west sides of I-93. Based on the PUD Master Plan (Pillsbury Realty Development, 2013), Woodmont Commons is divided into several phases, and development will occur over a 20-year period. The Town of Londonderry issued a conditional approval for the Phase I design plans in November 2016.

The Woodmont Commons development density with and without the Project is presented in the PUD Master Plan (Pillsbury Realty Development, 2013), and town planning staff indicated that the "without Exit 4A" scenario presented in the approved 2013 PUD Master Plan was based on design review meetings that included town staff, project engineers/planners, and the town's review consultant. Thus, the "with" and "without" Exit 4A scenarios (i.e., with Project and without Project scenarios) presented in the PUD Master Plan should not be construed as projections of growth, but rather should provide an upper cap on the maximum amount of development that could occur. This explains why less commercial development is allowed on the west side of I-93 without the Project than with it, even though the Project would provide no westerly access.

Without the Project, the Woodmont Commons development on the east side of I-93 would likely be a residential development model (up to 330 units as allowed by the PUD). The Londonderry planning staff agreed that the 400,000 gross square feet (gsf) of office development potentially allowed according to the PUD east of I-93 without the Project would likely not occur given the amount of traffic mitigation that would be required. Instead, a more realistic development scenario without the Project would be the aforementioned residential development with a small number of commercial businesses serving the needs of the 330 residential units (such as a convenience store or pharmacy).

With the Project, the current programming for the east side, which is also preferred by the Town of Londonderry, is for commercial land use accessed via Exit 4A. The developer expects a mixed-use build-out on the east side of I-93 to the level indicated by the caps in 2013 PUD Master Plan by 2040. In other words, the PUD caps represent a reasonable "Build" Scenario for the Project. No development would be expected to start until after the completion of the Project (currently expected by 2022). No potential development east of I-93 has been pre-sold or pre-leased (see Woodmont Commons Land Use Interview Summary, Appendix A).

With regard to development associated with Build Alternatives A, B, C, D, and F (from the 2007 DEIS), planners stated that growth in Londonderry under Alternatives C and D would be more in line with a No Build Alternative (or without the Project) because these alternatives would not provide access to the parcels that Woodmont Commons plans to develop for commercial and/or

institutional use. Given the easterly only access of the Project, development of the interchange would likely have little effect on the job growth or attraction of industries west of I-93.

4.3 Auburn, Chester, and Sandown

4.3.1 Auburn

Auburn is largely a bedroom community of about 16,000 acres with limited businesses. About a quarter of its area (4,200 acres) is the watershed for Massabesic Lake, which is the water supply for the City of Manchester. This limits the area available for development.

The primary drivers of growth are location and, more recently, the change in high school from Manchester to Pinkerton Academy. Auburn is located near Exits 1 and 2 of NH Route 101, which provides convenient access to I-93. Auburn's development has been different from most of the surrounding communities because it did not experience a decrease in development associated with the 2007–2008 recession. Auburn has issued approximately 35 new home building permits per year, and that did not change after 2007–2008. The Town Administrator stated that these new home permits are typically for custom homes on larger lots, and this trend of type and rate of residential development is expected to continue.

The Town Administrator indicated that the proposed Project is not likely to affect development and population growth in Auburn. Travel time may improve if some of the traffic on I-93 is pulled off the interstate by the Project, but this effect would likely be minor. Auburn residents would not be likely to use Exit 4A to travel from I-93 to Auburn because NH Route 101 already provides convenient access to the northern portion of the town, and the southern portion is closer to the existing Exit 5 than to Exit 4A.

4.3.2 Chester

Chester is a rural community east of Derry. Access to I-93 is primarily through the Town of Derry. Chester is currently experiencing significant growth pressure in the form of a recent resurgence (spring 2016) of single-family residential development. Development activity has recently restarted on many of the subdivisions that have been dormant or partially complete since the 2007–2008 recession. Chester currently has approved or pending permits to develop about 300 lots, which are anticipated to be developed in the next 5 to 7 years (2022-2024) (Appendix A). In addition, the Town has two 30-lot and three 5-lot subdivisions that will be approved in the near future. One of the 30-lot subdivisions is a Phase I – there will likely be an additional 90 lots in that 550-acre subdivision. The Chester Master Plan 2015 also recognizes this trend for residential growth in Chester. The plan notes that SNHPC projects that approximately 96 dwelling units would be constructed every 5 years through 2050 based on the town's historic growth rate and past building permit trends (Chester Planning Board, 2015). This long-term projection equates to an average of about 19 new home permits per year.

The primary drivers for additional residential development in Chester are good schools and the desire for rural living. Because the resurgence of residential/subdivision development is recent, it will likely be a year or two before Chester experiences a significant increase in elementary school enrollment. It is too early to determine whether a commensurate increase in school-age population or a shift in demographics of the population would occur; however, an increase is expected because most of the new homebuyers in Chester have one or more children.

Given Chester's access to I-93 through Derry, the planning coordinator indicated it was likely that the Project would induce additional residential development in Chester because of improved access to I-93.

Although the Project would enable additional growth in Chester, the town has a growth management provision in its zoning ordinance that would go into effect if pressure on school, fire, and police services outstrips the town's ability to keep pace with development. An open space subdivision provision is in place to encourage subdivisions to be creatively designed in a way that reduces sprawl and protects natural resources and rural character.

4.3.3 Sandown

Sandown is a rural community east of Derry, and highway access to the town is either by I-93 (via Route 102 through Derry) or by I-495 (via 121A through Plaistow). The primary driver for growth in Sandown is affordable housing—the bulk of housing in Sandown would be considered starter homes with regard to price and size. In addition, the Planning Board member interviewed indicated that transportation access to I-495 and an increase in telecommuting have contributed to population growth due to an increase in people seeking affordable housing. Sandown experienced a major influx of people during the 1990s until the recession in 2007–2008; however, Sandown is experiencing a resurgence of development similar to Chester. A 50-unit apartment building was recently approved, and two developments initially planned for residents ages 55 and older are now being developed for individuals of any age.

Although Sandown has had growth management ordinances in the past, these ordinances are no longer in place because of lawsuits by developers. Sandown is now focused on buying and conserving land to reduce the available developable land in the town. Sandown purchased 200 acres for conserved open space that had been approved for 154 dwellings for residents ages 55 and older, resulting in a reduction of housing potential in Sandown. The Planning Board is considering applying for another community technical assistance program grant to acquire and conserve more land. Most of the larger tracts have been developed, and Sandown has only a few 100-acre tracts left that could be developed as larger subdivisions.

Sandown has numerous wetlands and rivers, and in addition to purchasing land for conservation purposes, the town has a vernal pool protection provision in its zoning ordinance that includes a 25-foot buffer around vernal pools and a building setback requirement of 50 feet. In addition, the Planning Board has passed variable road width and stormwater regulations to reduce impervious surface and promote low impact development. The conservation measures are designed to improve the quality of natural resources and allow the town to reduce the amount of development and associated increase in school enrollment.

The Planning Board member stated during the interview that the widening of I-93 is having a substantial effect on growth in Sandown by reducing travel times on I-93, which makes Sandown more attractive for young homebuyers. The Planning Board member believes the proposed Project has the potential to induce additional residential development in Sandown by providing better access and reduced travel time to I-93.

5.0 DEVELOPMENT UNDER THE 2040 NO BUILD AND BUILD CONDITIONS

The 2040 No Build condition is the reasonably foreseeable future development anticipated without construction of the proposed Project. The 2040 Build condition is the reasonably foreseeable future development anticipated if the proposed Project is built and includes both the growth that is attributable to the improved transportation access created by the Project, as well as growth that is independent of the Project. The difference between the No Build and Build conditions is the indirect land use–or incremental–impact of the Project.

Both the 2040 No Build and 2040 Build conditions were developed after analyzing a variety of data sources and based on interviews with planners in local jurisdictions to ensure a collaborative process for land use and travel forecasting assumptions. Forecasting assumptions were also developed for the alternatives, as discussed in section 5.2 of this document. The overall process was guided by FHWA's *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA* (FHWA, 2010).

5.1 2040 No Build Condition

The 2040 No Build condition includes population, household, and employment information. As discussed, in sections 3.2 and 3.3, OEP and revised Chester population projections and the resulting SNHPC household projections account for the growth associated with the I-93 widening project. As noted in the memorandum in Appendix C, the employment growth rates projected by SNHPC are consistent with the historic relationship between population and employment growth in the region. In other words, because the SNHPC employment projections are consistent with the OEP population projections that include the I-93 widening effects, the SNHPC employment projections are also considered representative of the future condition with the widening of I-93 (even though specific projects were not considered in making the employment projections as documented in the correspondence with SNHPC). Each component is developed from the 2015 estimates or projections documented in sections 3.2 and 3.3; background growth, calculated as the difference in 2015 estimates and 2040 projections; and growth from known development projects. Each component (population, households, and employment) is discussed in more detail in the following sections.

5.1.1 Population, Household, and Employment Growth

Average annual population growth is projected to be 0.29 percent throughout the study area between 2015 and 2040, with annual population growth as high as 0.99 percent in Chester and as low as 0.03 percent in Derry. Annual household growth is projected to be 0.31 percent throughout the study area, with the highest annual household growth in Chester and Sandown at 0.99 and 1.14 percent, respectively. The lowest household average annual growth is projected to be in Derry at 0.32 percent, similar to the lower population growth in this town.

Based on updated SNHPC 2015 employment estimates and SNHPC 2016 projection 5-year growth trends through 2040, employment is projected to grow at an average of 1.04 percent average annual growth in the study area. Although 2015-2040 average annual employment growth for Chester is the highest of the jurisdictions at 2.21 percent, this value is elevated because of decreased 2015 employment values (see Section 3.3.3 for an explanation of the decreased 2015 Chester employment values). Analyzing the average annual employment growth

in Chester between 2010 and 2040 reveals a 0.62 percent annual employment growth rate as noted in section 3.3.2. Therefore, Auburn has the highest consistent average annual employment growth at 1.63 percent. Table 7 provides an overview of the 2040 No Build population, household, and employment components.

Table 7. 2040 No Build population, households, and employment

Municipality	Existing Population (2015 Projection)	Background Population Growth (2015-2040)	Average Annual Population Growth Rate (2015-2040)	Existing Households (2015 Projection)	Background Household Growth (2015-2040)	Average Annual Household Growth Rate (2015-2040)	Existing Employment (2015 Projection)	Background Employment Growth (2015-2040)	Average Annual Employment Growth Rate (2015-2040)
Derry	32,948	274	0.03%	12,656	17	0.01%	8,384	1,938	0.84%
Londonderry	24,891	2,145	0.33%	8,628	725	0.32%	13,517	4,033	1.05%
Auburn	5,315	733	0.52%	1,923	264	0.52%	1,846	914	1.62%
Chester	4,887	1,366	0.99%	1,621	456	0.99%	368	267	2.21%
Sandown	6,255	991	0.59%	2,193	721	1.14%	419	117	0.99%
Total Study Area	74,296	5,509	0.29%	27,021	2,183	0.31%	24,534	7,268	1.04%

Source: OEP (2016a); SNHPC (2016a, 2016b, 2016c; 2017), RPC (2015)
Note: See notes for Tables 3, 4, and 5 for information about projections.

5.1.2 Known Development Proposals

Reasonably foreseeable future development under the No Build condition includes known development proposals identified from land use planner interviews.

There are no large-scale planned developments in Derry—the extent of water and sewer service, the lack of large undeveloped parcels, and the topography in the eastern portion of Derry limit development. Lot size requirements and conserved land also constrain major single-family home developments in Derry. There is a 13-unit market-rate apartment building planned near the central business district. In addition, an area along South Main Street/Rockingham Road is zoned for commercial development, and the town is extending water and sewer service to allow the area to develop at a higher density. Both the 13-unit building and the infrastructure extension were judged to be accounted for in the background growth rate (e.g., the OEP population and SNHPC employment projections).

Londonderry has several known planned or proposed developments. The Woodmont Commons PUD is planned on the east and west sides of I-93 (see Figure 2 for the limits of the PUD). The Market Basket redevelopment area, shown in Figure 2, is owned by DeMoulas Super Markets, Inc. and is part of the Woodmont Commons Subarea WC-1GL, on the west side of I-93. The redevelopment area was approved by the Town of Londonderry in October 2015. The new Market Basket was constructed on the other side of the plaza from the original grocery store. The redevelopment approved in 2015 involved the demolition of about 74,000 gsf of commercial space and the addition of about 42,000 gsf of commercial development (Town of Londonderry, 2015). Construction is complete; as of May 2016, the 42,000 gsf were occupied by a state liquor store, a card store, TJ Maxx, and Marshall's Home Goods. In addition, there are four commercial pads available for development within the redevelopment area along John R. Michels Way, the roadway running through the Woodmont Commons development area connecting Garden Lane and Pillsbury Road. DeMoulas is currently looking for potential tenants and has received interest from multiple parties. The development of these parcels would occur with or without the Exit 4A Project. At this time, the types of tenants and buildings that would be constructed are unknown (see Appendix A, Woodmont Commons: Market Basket Redevelopment). Although the four pad sites have not been approved for development, it is possible that they could provide an additional 20,000 to 30,000 gsf of commercial development (see Appendix A: Londonderry Market Basket Redevelopment). As such, 30,000 gsf of potential additional commercial development has been included in the 2040 No Build condition.

In November 2016, the Town of Londonderry planning staff conditionally approved the Phase I plans for the initial Woodmont Commons development west of I-93, and Phase I is anticipated to be built by 2020. Phase I would include mixed use residential and commercial space, with approximately 60 percent retail space and 40 percent office space; five restaurants, including one restaurant/brewery; a hotel; a concert venue; and individual elderly living. Figure 2 shows the approximate location of Phase 1 of Woodmont Commons, and Table 8 shows a summary of uses planned for Phase I. Build Alternatives A though F are shown in Figure 2 for geographic reference.

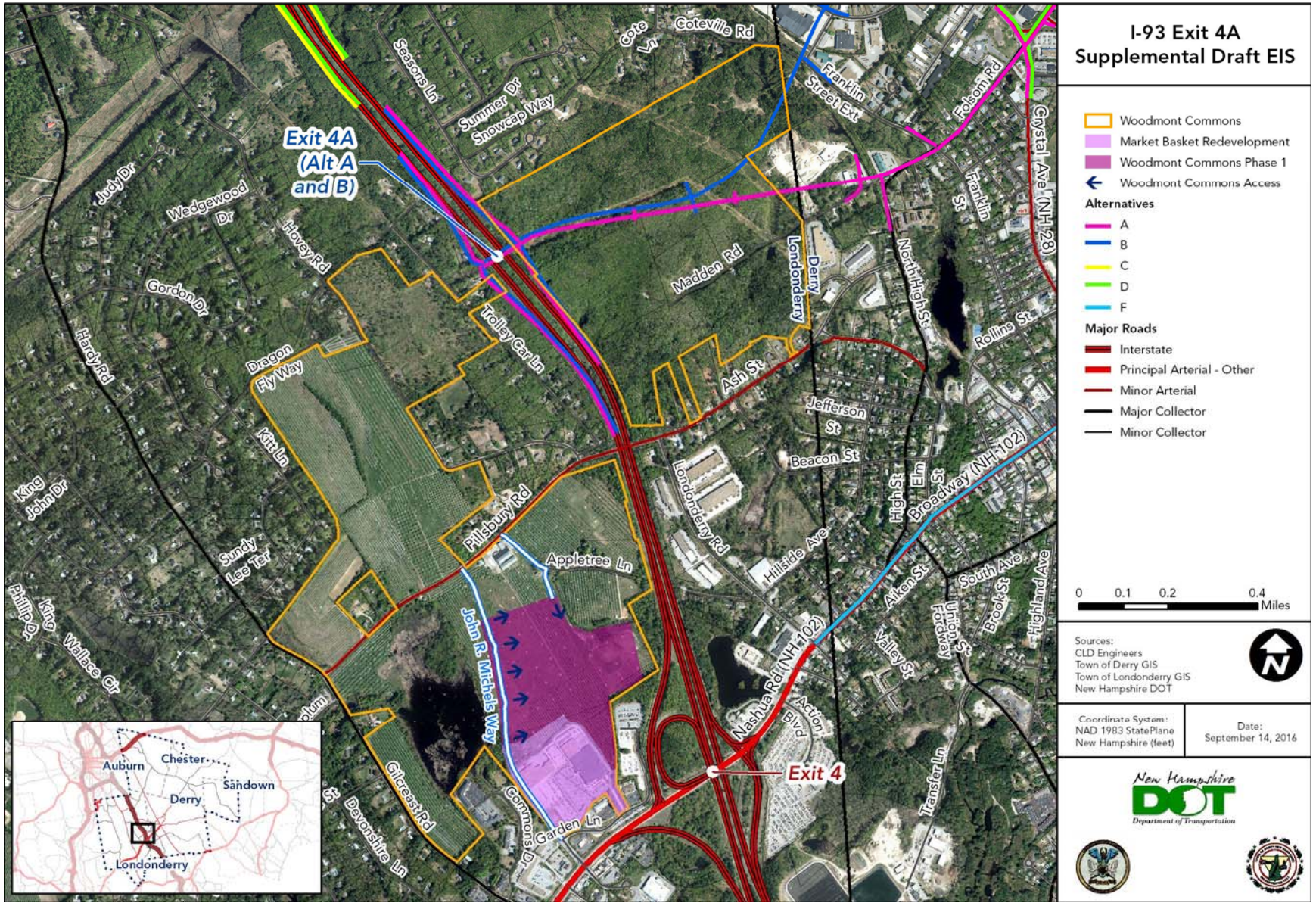

Figure 2. Woodmont Commons

Table 8. Woodmont Commons Phase I: summary of uses

Use		Quantity	Total
Residential	Any age	260 units	510 units
	Independent elderly living	250 units	
Commercial	Retail	163,611 gsf	312,574 gsf
	Office	107,800 gsf	
	Restaurant	568 seats or 15,593 gsf	
	Production (brewery)	11,400 gsf	
	Assembly	350 seats or 14,170 gsf	
Hotel		135 rooms	135 rooms

Source: Pillsbury Realty Development, LLC (2016)

Based on discussions with the Town of Londonderry and the developer, the remainder of the Woodmont Commons PUD area (east and west of I-93) is anticipated to be built out by 2040. The Woodmont Commons PUD Master Plan includes maximum development caps that would be permitted by Town of Londonderry for the PUD (east and west of I-93) with the Exit 4A Project and without the Exit 4A Project. The maximum growth caps outlined in the Woodmont Commons PUD Master Plan were used in the development of the No Build and Build conditions to provide a conservative estimate of indirect impacts (i.e., using the upper bound allowable growth results in predicting greater environmental impacts). The actual development that occurs within the Woodmont Commons PUD by 2040 may be less than this maximum depending on economic conditions and regulatory approvals (see section 2.4 for a discussion of the uncertainty associated with future growth impacts).

The Woodmont Commons PUD allows more growth on the east side of I-93 with Exit 4A than without Exit 4A, and this difference in growth forms the basis for the estimated indirect land use effects of Exit 4A on the east side of I-93 (see section 5.2.1, Table 14). The greater growth allowed with Exit 4A in Woodmont East is consistent with the direct interstate access to the east that would be provided by Alternatives A and B, increasing accessibility to undeveloped land along the interstate.

The Woodmont Commons PUD also allows more growth on the west side of I-93 with Exit 4A compared to the No Build condition. From a transportation access perspective, this increase in growth on the west side was not immediately intuitive given that Alternatives A and B would provide a direct connection to the east only. However, the project team identified several ways in which the Exit 4A Project could support increased development on the west side of I-93:

- Exit 4A would provide indirect interstate access to Woodmont West via internal roadways within Woodmont East, which would link to Pillsbury Road/Ash St. Pillsbury Road/Ash St. is an east-west roadway that crosses over I-93 and through the Woodmont West PUD area.
- Exit 4A has the potential to reduce demand on Exit 4 by diverting a portion of drivers currently using Exit 4 to the new Exit 4A. As a result, the Town of Londonderry would allow more development on the west side of I-93 because the potential constraint posed by Exit 4 operations would be lessened. Additional

information on traffic impacts will be available when the traffic technical report is completed.

- The large-scale economic development anticipated on the east side of I-93 with Exit 4A could have synergistic economic impacts on the west side of I-93. For example, additional office space would result in a large population in the area during the day and increase the demand for retail/restaurants.

The PUD "No Exit 4A" growth caps for Woodmont Commons were the primary basis for the No Build condition because the PUD itself provides a regulatory framework that would prohibit higher levels of growth without the appropriate transportation network support Exit 4A would provide. The developer would still attempt to maximize their return on investment by developing both the east and west sides of I-93 within the limits imposed by the PUD. The No Build condition forecast used for this project differs from the PUD "No Exit 4A" development caps in one important respect—it was determined through the interviews that the build-out of 400,000 gsf of commercial development on the east side of I-93 as included in the "No Exit 4A" PUD caps was not likely without Exit 4A due to the level of traffic mitigation that would be required. This level of development would require direct interstate access as would be provided with Exit 4A. Therefore, a predominately residential development is anticipated on the east side of I-93 without Exit 4A (330 households as allowed by the PUD). A small amount of supporting commercial was also included (20 sf/household).

In addition to Woodmont Commons, substantial industrial development is projected along the new Pettengill Road in Londonderry, which opened in December 2015. The relocated and new road extends from its former terminus at Industrial Drive to the new Raymond Wieczorek Drive (Applied Economic Research, 2012). The new road provides easier access to the Manchester-Boston Regional Airport and the F. E. Everett Turnpike/South Manchester from Londonderry and opened up nearly 1,000 acres of prime, non-residential land for business users. Based on SNHPC projections, the Pettengill Road Industrial Area would support a total of 1,750 industrial jobs in TAZ 64 and TAZ 274 in Londonderry from 2010 through 2050 (SNHPC, 2016b; 2016c). Assuming linear job growth for that 40-year period, five-eighths of that job growth would coincide with the analysis years of this report (2015–2040).[2] Therefore, this report assumes approximately 1,094 jobs would be added across this industrial area by 2040. These jobs would include at least a portion of the jobs associated with the proposed F.W. Webb distribution center, which is planned to include a 785,000-square-foot facility along Webb Drive, an extension of Pettengill Road (Heritage Commission, 2016).

Figure 3 shows future known, large-scale developments in Londonderry, and Table 9 presents a summary of these developments, including Woodmont Commons and future reasonable foreseeable development along Pettengill Road. Build Alternatives A though F are shown in Figure 3 for geographic reference.

[2] This report assumes that the first 5 years of Pettengill Road employment growth were incorporated into SNHPC 2015 updated employment projections. Overall Pettengill Road employment growth was added starting in 2010 because the estimate for Pettengill Road growth was designed to be added over the 2010-2050 time period.

Table 9. Summary of known large-scale development proposals in Londonderry (2040 No Build)

Development Name	Type/Land Use	Residential Units	Hotel Rooms	Commercial Area (gsf)	Industrial Area (Jobs)
Market Basket Redevelopment Area	Commercial	NA	NA	30,000	NA
Woodmont Commons Phase I (2020) – West of I-93[a]	Mixed Use – Commercial/ Residential	510	135	312,574	NA
Woodmont Commons Remainder (2040) – West of I-93[a]	Mixed Use – Commercial/ Residential	570	215	519,926	NA
Woodmont Commons – East of I-93[a]	Residential	330	0	6,600[c]	NA
Pettengill Road Industrial Area[b]	Industrial	NA	NA	NA	1,094
Total		**1,410**	**350**	**869,100**	**1,094**

Source: Pillsbury Realty Development (2013), SNHPC (2012a), Interviews with the Town of Londonderry and a Woodmont Commons representative (see Appendix A)

[a] Phase I includes development shown in Table 8 (Pillsbury Realty Development, 2013). The Woodmont Commons Remainder is the remaining development that would be permitted without Exit 4A that could be built by 2040.

[b] Job projections for Pettengill Road Industrial Area based on full projection of 1,750 jobs from 2010–2050 (SNHPC, 20116b; 2016c). This table assumes five-eighths (25 of 40 years or 2015–2040) of the projected jobs to match the timeframe of this report. It is assumed development along Pettengill Road would include the proposed approximately 785,000 gsf of development for the F.W. Webb distribution center.

c Based on the interview with the Woodmont Commons representative on August 7, 2016, it was agreed that developing the upper cap of 400,000 gsf of commercial on the east side of I-93 was unlikely without Exit 4A due to the traffic mitigation that would be required (see Appendix A). This new total assumes about 20 gsf of support commercial space per residential unit planned.

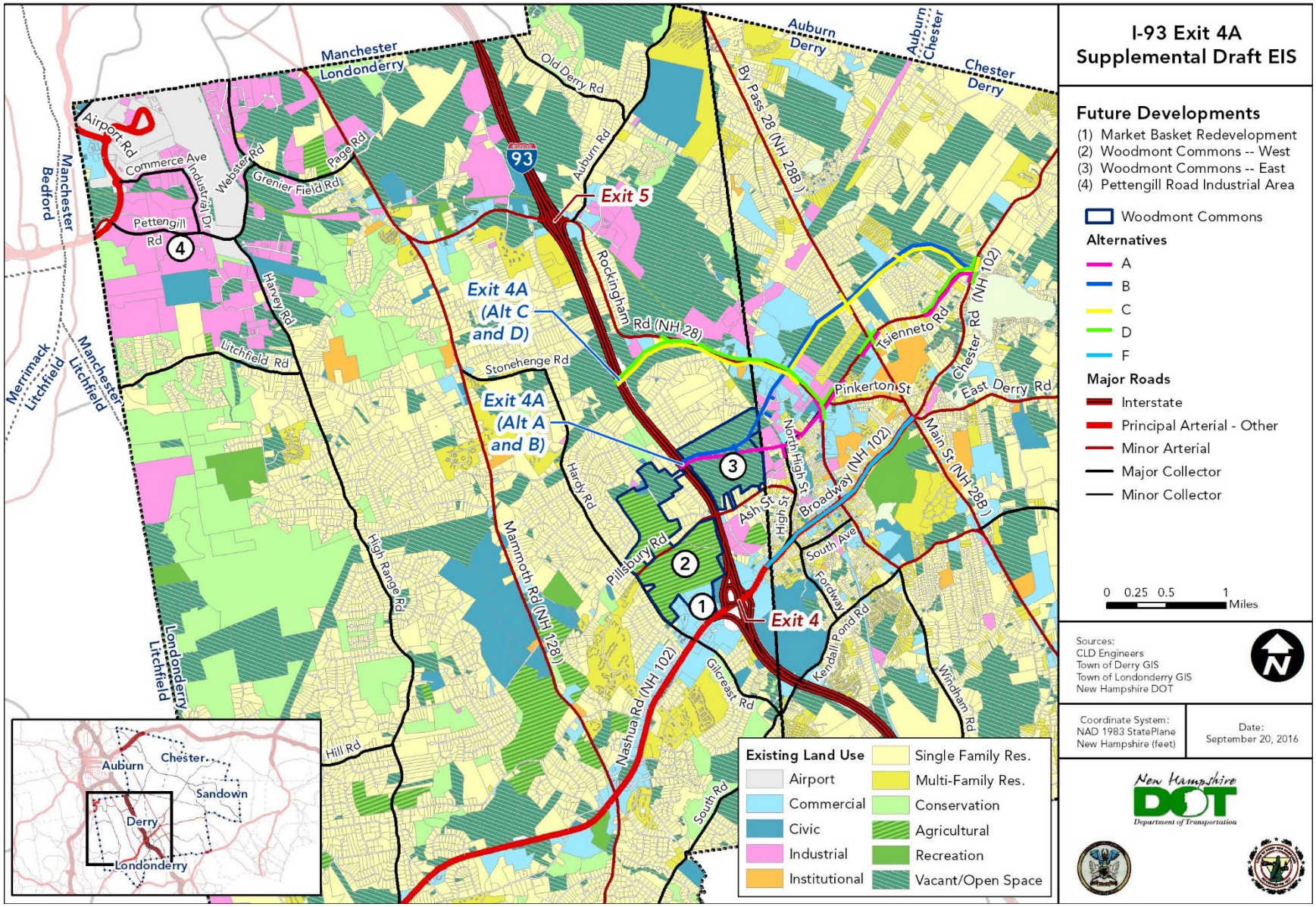

Figure 3. Large-scale developments in Londonderry

Population growth from known development projects, the last element used to calculate the 2040 No Build population, was calculated for residential units using average household size for the study area based on SNHPC population information.[3] Average household size was calculated following SNHPC's methods and used the occupancy rate from the 2010 Census (U.S. Census Bureau, 2010) and the existing (2015) population and housing units.[4] Based on a study area average household size of 2.73 persons and a total of 1,410 residential units under the No Build condition, the total 2040 No Build known development project population would be approximately 3,849 people. No adjustment to population was made to attempt to account for people moving to the study area for new employment opportunities, such as at Woodmont Commons. Given the dispersed nature of the local employment market, the employees in future industrial jobs, commercial development, or hotels would likely be spread throughout the region and would include people changing jobs, not simply migration.

Household growth from known development projects, also the last element used to calculate the 2040 No Build households, is based on the sum of residential units produced from the No Build known development projects in Table 9 multiplied by the occupancy rate. Because 2040 occupancy rates are unknown, the 2010 SNHPC weighted average occupancy rate of 95.4 percent was used to calculate households in 2040 (2016c).[5] Based on the known development projects including 1,410 residential housing units and an occupancy rate of 95.4 percent, the total No Build condition known development project households would be approximately 1,345. Because Woodmont Commons is the source of all of the known development project households, and Woodmont Commons is in Londonderry, all 1,345 known development project households are assigned to Londonderry in section 5.1.3.

Employment growth from known development projects is based on calculating the number of employees based on the size and type of known development project, unless the total number of jobs for a known development project was known as in the case of the Pettengill Road redevelopment. Using industry standard employee to gross square foot comparison factors by type of development, Table 10 calculates employees for each known development project given the retail assumptions noted in the "Conversion to Jobs" column (RKG Associates, 2016; MWCOG, n.d.). The remainder of the development associated with Woodmont Commons (post-phase 1) creates the most employment of any project with approximately 1,864 jobs produced based on an assumed mix of one-half general retail, one-quarter restaurants, and one-quarter other services. In total, approximately 4,219 No Build condition jobs are anticipated from the known development projects.

[3] Sandown is in the RPC boundary, and therefore is not included in the SNHPC data. However, none of the known development projects included residential units in Sandown, therefore it was reasonable not to include Sandown information in the population calculation.

[4] Household size = (Population – special population) / (housing units*occupancy rate). Special populations accounts for those living in dormitories, nursing homes, prisons, and drug treatment facilities – i.e., not standard housing units.

[5] Average occupancy rate was weighted based on number of dwelling units within each jurisdiction's TAZs. Footnote #2 regarding omission of Sandown information also applies to this calculation.

Table 10. 2040 No Build employment as a result of known developments in Londonderry

Development Name	Development Size and Type (or Jobs)	Conversion to Jobs	Jobs	Total Jobs per Project Phase
Market Basket Redevelopment Area	30,000 gsf of Commercial	¾ of gsf at Restaurants: 175 gsf / employee ¼ of gsf at Other Services: 400 gsf / employee	129 + 19	148
Woodmont Commons Phase I (2020) – West of I-93	135 Hotel Rooms	0.6 employees / room	81	1,113
Woodmont Commons Phase I (2020) – West of I-93	312,574 gsf of Commercial	½ of gsf at General Retail: 400 gsf / employee ¼ of gsf at Restaurants: 175 gsf/employee ¼ of gsf at Other Services: 400 gsf/employee	391 + 446 + 195	
Woodmont Commons Remainder (2040) – West of I-93	215 Hotel Rooms	0.6 employees / room	129	1,864
Woodmont Commons Remainder (2040) – West of I-93	519,926 gsf of Commercial	½ of gsf at General Retail: 400 gsf / employee ¼ of gsf at Restaurants: 175 gsf/employee ¼ of gsf at Other Services: 400 gsf/employee	650 + 743 + 325	
Woodmont Commons – East of I-93	6,600 gsf of Commercial	General Retail: 400 gsf/employee	17	
Pettengill Road Industrial Area	1,094 industrial jobs[a]	NA	1,094	1,094
Total			**4,219**	**4,219**

Source: Pillsbury Realty Development (2013), SNHPC (2012a), Interviews with the Town of Londonderry and a Woodmont Commons representative (see Appendix A), RKG Associates (2016), MWCOG (n.d.)

[a] See Table 8, footnote "b" for how Pettengill Road Industrial Area jobs were calculated.

5.1.3 Summary of 2040 No Build Condition

Based on the information presented above, the total 2040 No Build population for the study area would be approximately 83,654 as outlined in Table 11. Table 12 shows the total 2040 No Build households, and Table 13 shows the total 2040 No Build employment for the study area.

Table 11. Total 2040 No Build population for study area

Municipality	Existing Population (2015 Projection)	Background Population Growth from OEP/Chester Projections (2015–2040)	Population Growth from Known Development Proposals	Total 2040 No Build Population
Derry	32,948	274	0	33,222
Londonderry	24,891	2,145	3,849	30,885
Auburn	5,315	733	0	6,048
Chester	4,887	1,366	0	6,253
Sandown	6,255	991	0	7,246
Study Area Total	74,296	5,509	3,849	83,654

Source: OEP (2016a), Town of Chester (Appendix A), Pillsbury Realty Development (2013), U.S. Census (2010)
Note: See notes for Table 3 for information about projections.

Table 12. Total 2040 No Build households for study area

Municipality	Existing Households (2015 Projection)	Background Household Growth (2015–2040)	Household Growth from Known Development Proposals	Total 2040 No Build Households
Derry	12,656	17	0	12,673
Londonderry	8,628	725	1,345	10,968
Auburn	1,923	264	0	2,188
Chester	1,621	456	0	2,077
Sandown	2,193	721	0	2,914
Study Area Total	27,021	2,183	1,345	30,546

Sources: SNHPC (2012b, 2016a, 2016d; 2017), RPC (2015), Pillsbury Realty Development (2013)
Note: See notes for Table 4 for information about projections.

Table 13. Total 2040 No Build employment for study area

Municipality	Existing Employment (2015 Projection)	Background Employment Growth from SNHPC/ RPC Projections (2015–2040)	Employment Growth From Known Development Proposals	Total 2040 No Build Employment
Derry	8,384	1,938	0	10,322
Londonderry	13,517	4,033	4,219	21,769
Auburn	1,846	914	0	2,760
Chester	368	267	0	635
Sandown	419	117	0	536
Study Area Total	24,534	7,268	4,219	36,021

Sources: SNHPC (2012b, 2016b, 2016c), RPC (2015), Pillsbury Realty Development (2013), RKG Associates (2016), MWCOG (n.d.), Interviews with the Town of Londonderry and a Woodmont Commons representative (see Appendix A)

Note: See notes for Table 6 for information about projections.

5.2 2040 Build Condition

The 2040 Build condition is developed by adding the population, households, and employment growth from development anticipated to be induced by the proposed Project to the 2040 No Build condition values. The induced development presented for the 2040 Build condition is based on Alternative A, which was identified as the preferred alternative in the 2007 DEIS. Alternatives A and B would induce the greatest amount of development relative to the other build alternatives. A comparison of Alternatives B, C, D, and F to the 2040 Build condition (Alternative A) follows the presentation of the anticipated growth for Alternative A.

5.2.1 Alternative A

This section first discusses the incremental impact of Alternative A (e.g., indirect land use effects), and then provides a summary of the total 2040 Build condition land use forecast.

Indirect Land Use Effects

The additional reasonably foreseeable future development under Alternative A was identified through the land use planner interviews. Table 14 provides a summary of the incremental growth anticipated to be induced by Alternative A, which includes changes in the density and type of development anticipated for Woodmont Commons, as well as commercial and industrial growth in Derry induced by improved access to I-93.

Table 14. Summary of indirect land use effects of Alternative A

Development Name	Type/Land Use	Residential Units	Hotel Rooms	Commercial Area (gsf)	Institutional (gsf)	Industrial Area (jobs)
Derry	Commercial/ Industrial	NA	NA	0	NA	168[b]

Development Name	Type/Land Use	Residential Units	Hotel Rooms	Commercial Area (gsf)	Institutional (gsf)	Industrial Area (jobs)
Woodmont Commons – West of I-93	Mixed Use – Commercial/ Residential	6	0	322,000	40,000	NA
Woodmont Commons – East of I-93[a]	Mixed Use – Commercial/ Residential	3	200	693,400[a]	420,000	NA
Chester	Residential	371	NA	NA	NA	NA
Sandown	Residential	9	NA	NA	NA	NA
Total		**389**	**200**	**1,015,400**	**460,000**	**168**

Source: Pillsbury Realty Development (2013), Interviews with the Towns and a Woodmont Commons representative (see Appendix A).

[a] Based on the interview with the Woodmont Commons representative on August 7, 2016, it was agreed that developing the upper cap of 400,000 gsf of commercial uses on the East side of I-93 for Phase 1 was unlikely without Exit 4A due to the traffic mitigation that would be required (see Appendix A and footnotes to Table 8). This Build condition value total assumes the difference between the likely No Build Phase 1 commercial development (400,000 gsf – 6,600 gsf) plus the remainder of the East side development that would be anticipated as a result of the access provided by Exit 4A (300,000 gsf).

[b] Because it is not possible to predict which type of jobs would result from Derry's industrial rezoning and redevelopment due to the flexible nature of the Industrial District IV zoning that allows retail, commercial, and industrial development, all jobs were assumed to be in the industrial category.

Town of Derry

The Town of Derry has several parcels zoned as Industrial IV, which allows commercial and industrial uses, east of I-93 along Folsom Road, north of North High Street. Redevelopment of the parcels currently zoned as industrial would be encouraged by Alternative A, which provides access to I-93 via Folsom and Madden Roads. The parcels south of Madden and Folsom Roads and west of North High Street were rezoned as Industrial VI in 2004, and construction of the Corporate Park Industrial Park was completed in 2005. Presently, the Town of Derry is undertaking a study to determine whether to rezone several residential properties currently zoned as medium-high density residential to an industrial zoning category (Figure 4). Figure 4 shows these properties and their relationship to Alternative A.

With regard to the properties along Folsom Road north of North High Street, the Build condition includes an estimate of the possible redevelopment that could be induced by Alternative A. To determine the amount of induced development on these parcels, it was necessary to determine the amount of likely existing development or jobs and subtract that from the amount of possible future development or jobs. It was assumed that the industrially zoned properties south of Folsom and Madden Roads would not be redeveloped because the properties have been recently developed (2005). Therefore, only the properties north of Folsom and Madden Roads that are zoned as Industrial District IV were examined for redevelopment.

Of the 10 Industrial District IV properties north of Folsom and Madden Roads that could be developed to higher intensity as a result of Alternative A, only four have existing structures that appear to be places of work rather than residences. Based on Geographic Information System

(GIS) information from the Town of Derry, the footprints of the existing buildings total 43,478 square feet. Based on a windshield survey of the type of businesses, Table 15 outlines the approximate amount of square footage for each use. Using industry-standard employee to gross square foot comparison factors by type of development, Table 15 also provides an estimate of the number of existing employees at the Derry Industrial District IV parcels.

Table 15. Existing Derry Industrial District IV development type and estimated employees

Development Type	Development Size	Conversion to Jobs	Jobs
Retail	8,328 gsf	General Retail: 400 gsf/employee	21
Office	18,322 gsf	Industrial Office: 300 gsf/employee	61
Industrial/Manufacturing	27,191 gsf	Industrial/Manufacturing: 800 gsf/employee	34
		Total	**116**

Source: Town of Derry GIS, RKG Associates (2016); MWCOG (n.d.)
Note: The total amount of development (development size) is greater than the total building footprint size because several buildings appeared to have partial second floors.

Appendix G of the I-93 Widening (Salem to Manchester) Supplemental Environmental Impact Statement (SEIS) includes a memorandum providing revised local future employment estimates to account for the potential indirect land use effects of Exit 4A (NHDOT and FHWA, 2010). The analysis conducted for this memorandum is no longer relevant because the Woodmont PUD was not available at that time (among other changes over time).However, the memorandum included research on employment densities of select industrial properties in Londonderry and Derry that remains applicable and useful for this study. To estimate the potential industrial redevelopment potential of the Industrial District IV properties, the average industrial employment density from the research provided in Appendix G of the I-93 Widening SEIS is used in this report. Table 16 includes the employment densities of three industrial properties in Derry from Appendix G of the SEIS and their average employment density.

Table 16. Employment density of select industrial businesses in Derry

Name	Address	Product/ Service	Parcel Size (acres)	Employees	Employment Density (employees per acre)	Average Employment Density (employees per acre)
Fireye	3 Manchester Road	Fire equipment	10	150	15.0	12.0
Sammina	2 Treasure Lane	Circuit boards	6	80	13.3	
Merrimack Valley Wood Products	1 B Street	Door and window units	9	70	7.8	

Source: NHDOT and FHWA (2010)

The total area of Industrial District IV properties within the identified redevelopment area that are more than 1 acre (the minimum lot size required by zoning to develop a property in Industrial District IV) is 31.7 acres.[6] Using the average industrial employment density in Table 16 and the amount of Industrial District IV acreage available, the estimated future employment capacity of the Industrial District IV properties is 380 jobs. Although it is not possible to know whether the market could support build out in this area by 2040, these jobs are estimated to be potentially attributable to the interstate access improvements provided to this area of Derry by Alternative A. Additionally, some of the parcels greater than 1 acre adjacent to and north of Folsom and Madden Roads would be transected by Alternative A, which may result in a lower estimated future employment capacity. Subtracting the total number of existing jobs on these industrial properties (see Table 15), the net approximate Build condition employment for these rezoned Industrial District IV properties is 264 jobs.

As previously mentioned, there is the potential for rezoning several residential properties currently zoned as medium-high density residential to an industrial zoning category (Figure 4). If these 10 residential properties were to be rezoned to Industrial Districts IV or VI, only as many as four of the properties could be redeveloped as industrial if properties were not combined because of the minimum lot area requirement in both zoning categories of 1 acre (Town of Derry, 2016). Assuming all four of these properties more than 1 acre were rezoned and redeveloped, a total of 6.8 acres, there would be about 82 jobs produced from the redevelopment based on the aforementioned acre-to-employee conversion factors.

Town of Londonderry

The change in type and amount of development anticipated for Woodmont Commons is based on the modification of the development that would be permitted by the Town of Londonderry (e.g., the "With Exit 4A" scenario from the PUD Master Plan) (see section 4.2). It should be noted that the Woodmont Commons PUD Master Plan includes the maximum possible development that would be permitted by Town of Londonderry for the PUD (east and west of I-93) with the Exit 4A Project. As mentioned in sections 2.4 and 5.1.2, this maximum development has been used as a conservative measure to evaluate potential environmental impacts (i.e., resulting from the development of available land) and should not be construed as a prediction of economic benefit of the Proposed Project. The amount of development for Woodmont Commons was converted into 2040 Build condition population, households, and employment (jobs) using the same methodology discussed in section 5.1.2. Therefore, based on a study area average household size of 2.73 persons and a total of nine Build residential units, the total 2040 Build known development population would be approximately 25 people. Household growth was calculated by multiplying the residential units produced in Woodmont Commons by the 2010 SNHPC weighted average occupancy rate of 95.4 percent, resulting in about nine households.

Employment growth (jobs) from known development projects was calculated based on the size and type of known development project, using the industry standard employee to gross square foot comparison factors by type of development (RKG Associates, 2016; MWCOG, n.d.; U.S. Green Building Council, 2008). Given the assumptions noted in Table 17, approximately 4,335 Build condition jobs are anticipated as a result of the development induced by the Exit 4A Project. This "incremental growth" is added to the No Build condition total population,

[6] Two parcels shared the same parcel number and therefore were considered as one.

households and employment to obtain the total Build condition socioeconomic inputs for the traffic modeling.

The industrial developments in the northwest portion of Londonderry would not be affected by the Project. Access to those parcels is provided by Pettengill Road and Raymond Wieczorek Drive (Manchester Airport Access Road).

Table 17. 2040 Build condition incremental employment growth as a result of known developments in Londonderry

Development Name	Development Size and Type	Conversion to Jobs	Jobs
Woodmont Commons – West of I-93	322,000 gsf of Commercial	½ of gsf at General Retail: 400 gsf / employee ¼ of gsf at Restaurants: 175 gsf/employee ¼ of gsf at Other Services: 400 gsf/employee	403 + 460 + 201
	40,000 gsf of Institutional (Assisted Living)	Lodging: 1,124 gsf/employee	37
Woodmont Commons – East of I-93	200 Hotel Rooms	0.6 employees / room	120
	693,400 gsf of Commercial	½ of gsf at General Retail: 400 gsf / employee ¼ of gsf at Restaurants: 175 gsf/employee ¼ of gsf at Other Services: 400 gsf/employee	867 + 991 + 433
	420,000 gsf of Institutional (Hospital and Assisted Living)	250,000 gsf at Hospital: 429 gsf/employee 170,000 gsf of Lodging: 1,124 gsf/employee	667 + 156
Total			**4,335**

Source: Pillsbury Realty Development (2013), RKG Associates (2016), MWCOG (n.d.), USGBC (2008)

Chester, Sandown, and Auburn

As discussed in the interview summaries, Chester and Sandown are likely to experience additional residential development as a result of Alternative A due to the improved access provided by Exit 4A, which would enable commuters to bypass downtown Derry. Even considering the growth management strategies discussed in section 4.0, the local planners agreed that Alternative A could contribute to Chester and Sandown reaching their 2040 projected population earlier than would otherwise occur in the No Build condition. The potential range of impacts was considered by examining two scenarios:

- Moderate growth impact scenario- Chester and Sandown reach their 2040 population level 5 years early, in 2035. Between 2035 and 2040, the population of both towns continues to grow at the same rate as OEP's projection for 2035-2040.
- High growth impact scenario- Chester and Sandown reach their 2040 population level 10 years early in 2030. Between 2030 and 2040, the population of both towns continues to grow at the same average annual rate as OEP's projection for 2030-2040.

Table 18 presents a comparison of the No Build and both the moderate growth and high-growth impact scenario populations for Chester and Sandown. To present a conservative assessment of potential impacts, the high growth impact scenario was used for impact analysis and incorporated in the travel demand model. The high growth impact scenario yields an additional 1,117 people in Chester and 21 people in Sandown under the 2040 Build condition. Using the 2040 population and household information to determine average household size for each town in 2040, the additional people yield approximately 371 and 9 additional households in 2040 for Chester and Sandown, respectively.

Auburn is not likely to experience a change in growth and development associated with Alternative A because Auburn already has more direct access to I-93 via Exit 5 and NH 101. The local official interviewed as part of this study concurred with this conclusion (see Appendix A).

Table 18. Chester and Sandown 2040 Build condition population growth

Town	Impact Scenario	Population				Population Increase Over No Build in 2040
		2015	2030	2035	2040	
Chester	No Build	4,887	6,101	6,177	**6,253**	NA
	Moderate Growth (Build)	4,887	5,879	**6,253**	6,789	535
	High Growth (Build)	4,887	**6,253**	6,789	7,370	1,117
Sandown	No Build	6,255	7,140	7,229	**7,246**	NA
	Moderate Growth (Build)	6,255	7,061	**7,246**	7,249	3
	High Growth (Build)	6,255	**7,246**	7,257	7,267	21

Source: OEP (2016a)

2040 Build Condition Land Use Forecast Summary

Based on the information presented above, the 2040 Build population for the study area is estimated to be 83,654, as outlined in Table 19, an increase of 1,163 people over the No Build condition. Tables 20 and 21 show the total households and employment (jobs), respectively, for the study area under the 2040 Build condition. The total number of 2040 Build households for the study area is estimated to be 34,190, an increase of 389 households over the No Build condition (Table 20), and the 2040 Build employment for the study area is estimated to be 39,975 jobs, an increase of 4,681 jobs over the No Build condition (Table 21). The large increase in employment under the Build condition is primarily attributable to the additional build out of Woodmont Commons that Londonderry will permit with the completion of Exit 4A.

Table 19. Total 2040 Build condition population for study area

Municipality	2040 No Build Population	2040 Build Incremental Development Project Population	Total 2040 Build Population	Percent Difference between No Build and Build
Derry	33,222	0	33,222	0.00%
Londonderry	30,885	25	30,910	0.08%
Auburn	6,048	0	6,048	0.00%
Chester	6,253	1,117	7,370	16.40%
Sandown	7,246	21	7,267	0.29%
Study Area Total	83,654	1,163	84,818	1.38%

Table 20. Total 2040 Build condition households for study area

Municipality	2040 No Build Households	2040 Build Incremental Development Project Households	Total 2040 Build Households	Percent Difference between No Build and Build
Derry	12,673	0	12,673	0.00%
Londonderry	10,695	9	10,704	0.08%
Auburn	2,187	0	2,187	0.00%
Chester	2,077	371	2,448	16.40%
Sandown	2,914	9	2,923	0.29%
Study Area Total	30,546	389	30,935	1.26%

Table 21. Total 2040 Build condition employment for study area

Municipality	2040 No Build Employment	2040 Build Incremental Development Employment	Total 2040 Build Employment	Percent Difference between No Build and Build
Derry	10,479	346	10,825	3.25%
Londonderry	20,875	4,335	25,210	18.81%
Auburn	2,764	0	2,764	0.00%
Chester	641	0	641	0.00%
Sandown	536	0	536	0.00%
Study Area Total	35,294	4,681	39,975	12.44%

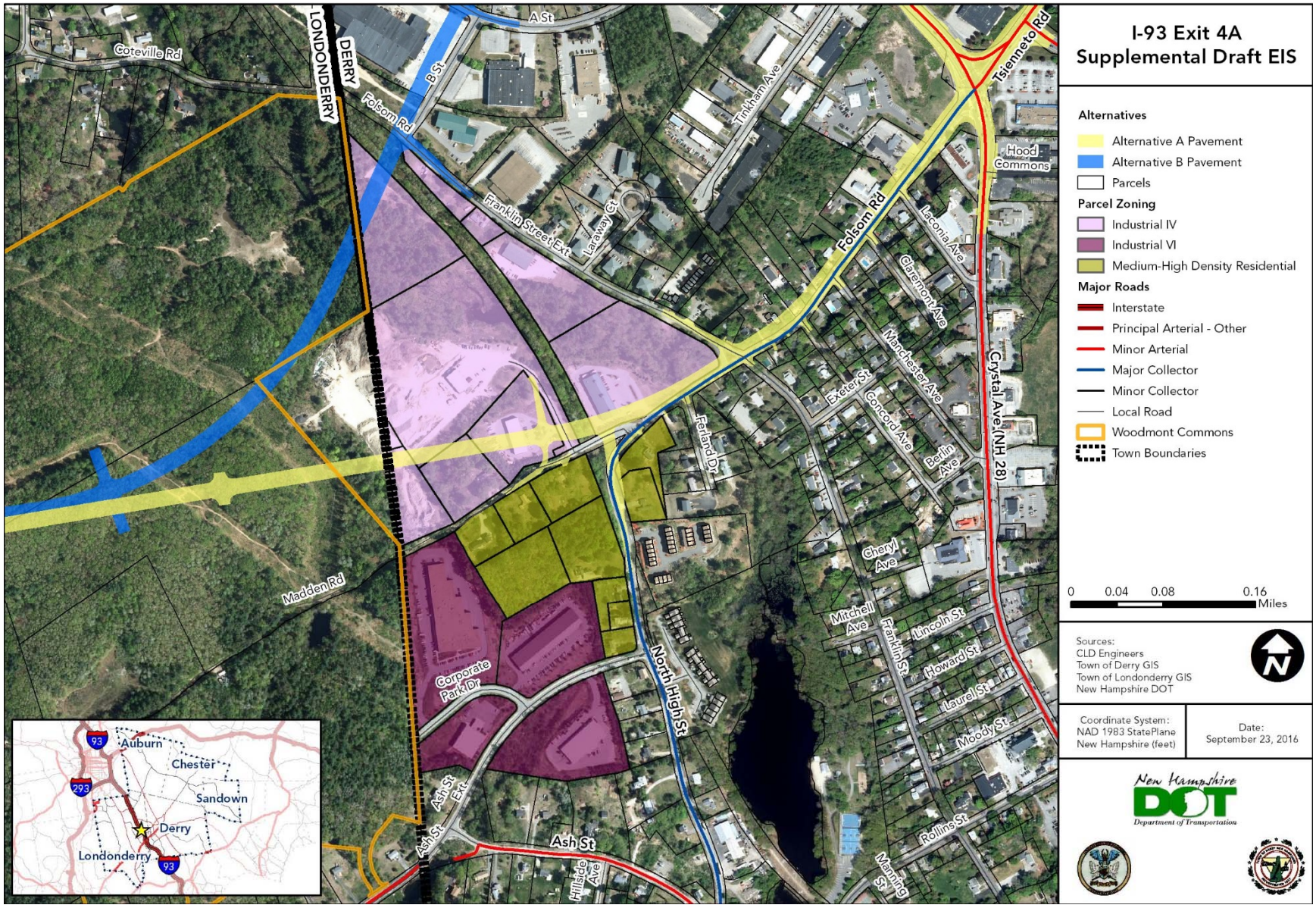

Figure 4. Location of potential redeveloped and rezoned properties in the Town of Derry

5.2.2 Alternative B

Compared to Alternative A, Alternative B would be expected to result in similar commercial and industrial growth in Derry. Although the exact location of the connector road would be different from that proposed for Alternative A, Alternative B would provide access to the area zoned as Industrial IV and the area being considered for rezoning. The development associated with Woodmont Commons and Chester are anticipated to be similar under Alternatives A and B. As previously mentioned, the proposed Project is not expected to affect the industrial developments in the northwest portion of Londonderry and residential development in Auburn. Finally, the anticipated increased rate of residential development in Chester and Sandown would be similar under Alternatives A and B.

5.2.3 Alternative C

The commercial and industrial development anticipated in Derry under Alternative A would not be realized under Alternative C because the rezoned parcels along Folsom Road north of North High Street would not have direct access to the interchange. As Figure 3 shows, the alignment of Alternative C would constrain additional commercial/industrial development due to lack of available land adjacent to the right-of-way. As the alignment approaches I-93, a transmission line and conservation areas limit the available land for development. Where the alignment follows Route 28, the adjacent land is largely built out with commercial and industrial uses. Although it is possible that some of the commercial and industrial parcels could be redeveloped, it is unlikely to result in a substantive net gain of commercial or industrial space because of the size of the individual parcels.

Londonderry planning staff and the Woodmont Commons representative indicated that Build Alternative C would limit access to the area available for development near I-93 to an extent that, if this alternative were selected, the Woodmont Commons area on the east side of I-93 would be developed as detailed under the No Build (e.g., primarily residential, 330 households). As previously mentioned, the proposed Project is not expected to affect the industrial developments in the northwest portion of Londonderry and residential development in Auburn. Finally, the anticipated increased rate of residential development in Chester and Sandown would be similar under Alternatives A and B given that the Alternative C interchange/roadway improvements would still provide a bypass of downtown Derry (although with a less direct route than Alternative A).

5.2.4 Alternative D

Development under Alternative D would be the same as that anticipated under Alternative C because the interchange would be located in the same location as Alternative C. Roadway improvements would follow Tsienneto Road to connect with NH 102 (similar to Alternative A).

5.2.5 Alternative F

Alternative F would involve an upgrade of NH Route 102 between Londonderry Road and the NH Route 28 Bypass. Development under Alternative F in the area of Woodmont Commons and the industrial area of Derry would be the same as that anticipated under the No Build condition. The indirect land use impacts on Chester and Sandown are not anticipated. Although the improvements on NH 102 would reduce congestion through downtown Derry, Alternative F does

not include improvements that would enable commuters to bypass downtown Derry, thereby encouraging growth in Chester or Sandown.

6.0 ALLOCATION OF GROWTH TO TRAFFIC ANALYSIS ZONES

The purpose of this section is to document how the town-level and development-specific projections for the No Build and Build conditions discussed in prior sections were allocated to geographic unit required by the SNHPC traffic model, the TAZ. The Traffic Technical Report will discuss in detail how the population, household, employment projections from this Report will be used to develop traffic data.The anticipated population, household, and job growth associated with the known No Build developments was assigned to TAZs based on the percentage of the development land area in each TAZ. The detailed formulas for assigning population and households to TAZ are provided in a memorandum in Appendix D. Table 22 shows the 2040 No Build condition growth from known developments, and Table 23 shows the total 2040 No Build condition. Employment data are not available for publication due to confidentiality issues.

Table 22. 2040 No Build condition growth from known developments by TAZ

Municipality	TAZ	2040 No Build Condition Known Development Growth			Associated Growth Notes
		Population	Households	Employment	
Londonderry	277	0	0	148	Market Basket Redevelopment
Londonderry	277	1,392	486	1,113	Woodmont Commons Phase 1 - West
Londonderry	99	813	284	965	Woodmont Commons Remainder - West
Londonderry	277	743	260	882	Woodmont Commons Remainder - West
Londonderry	69	520	182	10	Woodmont Commons - East
Londonderry	375	381	133	7	Woodmont Commons - East
Londonderry	64L	0	0	525	Pettengill Road Industrial Area
Londonderry	274	0	0	569	Pettengill Road Industrial Area
Study Area Total	NA	3,849	1,345	4,219	

Table 23. 2040 No Build condition by TAZ

Municipality	TAZ	2040 Background Growth			2040 No Build Known Developments			2040 Total No Build Condition		
		Population	Households	Employment	Population	Households	Employment	Population	Households	Employment
Derry	132	773	339	CI	0	0	0	773	339	CI
Derry	133	85	29	CI	0	0	0	85	29	CI
Derry	377	13	3	CI	0	0	0	13	3	CI
Londonderry	64L	0	0	CI	0	0	525	0	0	CI
Londonderry	69	74	23	CI	520	182	10	594	205	CI
Londonderry	99	885	304	CI	813	284	965	1,698	588	CI
Londonderry	274	405	118	CI	0	0	569	405	118	CI
Londonderry	277	31	11	CI	2,135	746	2,143	2,166	757	CI
Londonderry	375	0	0	CI	381	133	7	381	133	CI
Auburn[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chester	148	796	275	CI	0	0	0	796	275	CI
Chester	149	632	225	CI	0	0	0	632	225	CI
Chester	150	566	220	CI	0	0	0	566	220	CI
Chester	151	624	223	CI	0	0	0	624	223	CI
Chester	152	1,535	448	CI	0	0	0	1,535	448	CI
Chester	153	526	180	CI	0	0	0	526	180	CI
Chester	154	635	229	CI	0	0	0	635	229	CI
Chester	155	938	277	CI	0	0	0	938	277	CI
Sandown[b]	NA	NA	NA	NA	0	0	0	NA	NA	NA
Total	NA	8,519	2,905	CI	3,849	1,345	4,219	12,368	4,250	CI

Notes: TAZs in this table are those that include population, household, and employment growth from known developments under the No Build condition or incremental growth associated with the Build condition (Alternative A). The whole-town TAZ tables for the entire study area are included in Appendix D. SNHPC background employment data by TAZ is confidential and not available for publication. CI = Confidential Information.

[a] Auburn is listed as NA because there are no known developments or induced growth anticipated; therefore, population, households, and employment were not allocated to TAZs.

[b] The anticipated induced population and household growth for Sandown was not assigned to TAZs because Sandown is located in an external zone in the traffic demand model.

The 2040 Build condition incremental growth associated with Derry redevelopment, Woodmont Commons, and induced residential development was assigned to TAZs using the following approach. The anticipated job growth that could result from Derry redevelopment was assigned based on the location of the parcels currently zoned as Industrial IV within each TAZ that would have access to I-93 as a result of Alternative A. The anticipated job growth that could result from the potential Derry rezoning was assigned based on the location of the parcels currently zoned as medium high density residential within each TAZ that would have access to I-93 as a result of Alternative A. The anticipated population, household, and job growth associated with Woodmont Commons was assigned to TAZs based on the percentage of the Woodmont Commons development area in each TAZ. In Chester, the population and household growth anticipated to be induced by Alternative A was allocated to TAZs by overlaying the town and TAZ boundaries and assigning population and households based on the percentage of the town area within each TAZ. The anticipated induced population and household growth for Sandown was not assigned to TAZs because Sandown is located in an external zone in the traffic demand model.[7] Table 24 presents the incremental population, household, and job growth by TAZ that would be induced by Alternative A for the 2040 Build condition. The TAZs shown in Table 24 and Figure 5 (Sheets 1 and 2) are the ones to which growth was assigned. Table 25 shows the total 2040 Build condition anticipated under Alternative A, which includes the 2040 total No Build condition and the incremental growth associated with Alternative A. Appendix D contains detailed tables showing all of the TAZs in the study area and the population, household, and job growth for the 2040 No Build condition and the Build conditions associated with each alternative (A, B, C, D, and F).[8]

Table 24. 2040 Build condition incremental growth associated with Alternative A by TAZ

Municipality	TAZ	2040 Incremental Build Condition Growth (Alternative A)			Associated Growth Notes
		Population	Households	Employment	
Derry	132	0	0	14	Derry Industrial Redevelopment
Derry	133	0	0	106	Derry Industrial Redevelopment
Derry	377	0	0	226	Derry Industrial Redevelopment
Londonderry	99	9	3	575	Woodmont Commons West
Londonderry	277	8	3	526	Woodmont Commons West
Londonderry	69	5	2	6	Woodmont Commons East

[7] Incorporation of Sandown indirect land use impacts in the SNHPC model is not necessary given the minor growth impact estimated.

[8] TAZs for Sandown are not included because of its location outside the SNHPC travel demand model region.

Municipality	TAZ	2040 Incremental Build Condition Growth (Alternative A)			Associated Growth Notes
		Population	Households	Employment	
Londonderry	375	3	1	1,368	Woodmont Commons East
Auburn	NA	0	0	0	No projects or induced growth
Chester	148	121	40	0	Induced growth due to access
Chester	149	126	42	0	Induced growth due to access
Chester	150	204	68	0	Induced growth due to access
Chester	151	144	48	0	Induced growth due to access
Chester	152	241	80	0	Induced growth due to access
Chester	153	103	34	0	Induced growth due to access
Chester	154	93	31	0	Induced growth due to access
Chester	155	85	28	0	Induced growth due to access
Sandown[a]	NA	21	9	0	Not allocated due to location outside of traffic model
Study Area Total	NA	1,163	389	4,681	NA

[a] The anticipated induced population and household growth for Sandown was not assigned to TAZs because Sandown is located in an external zone in the traffic demand model.

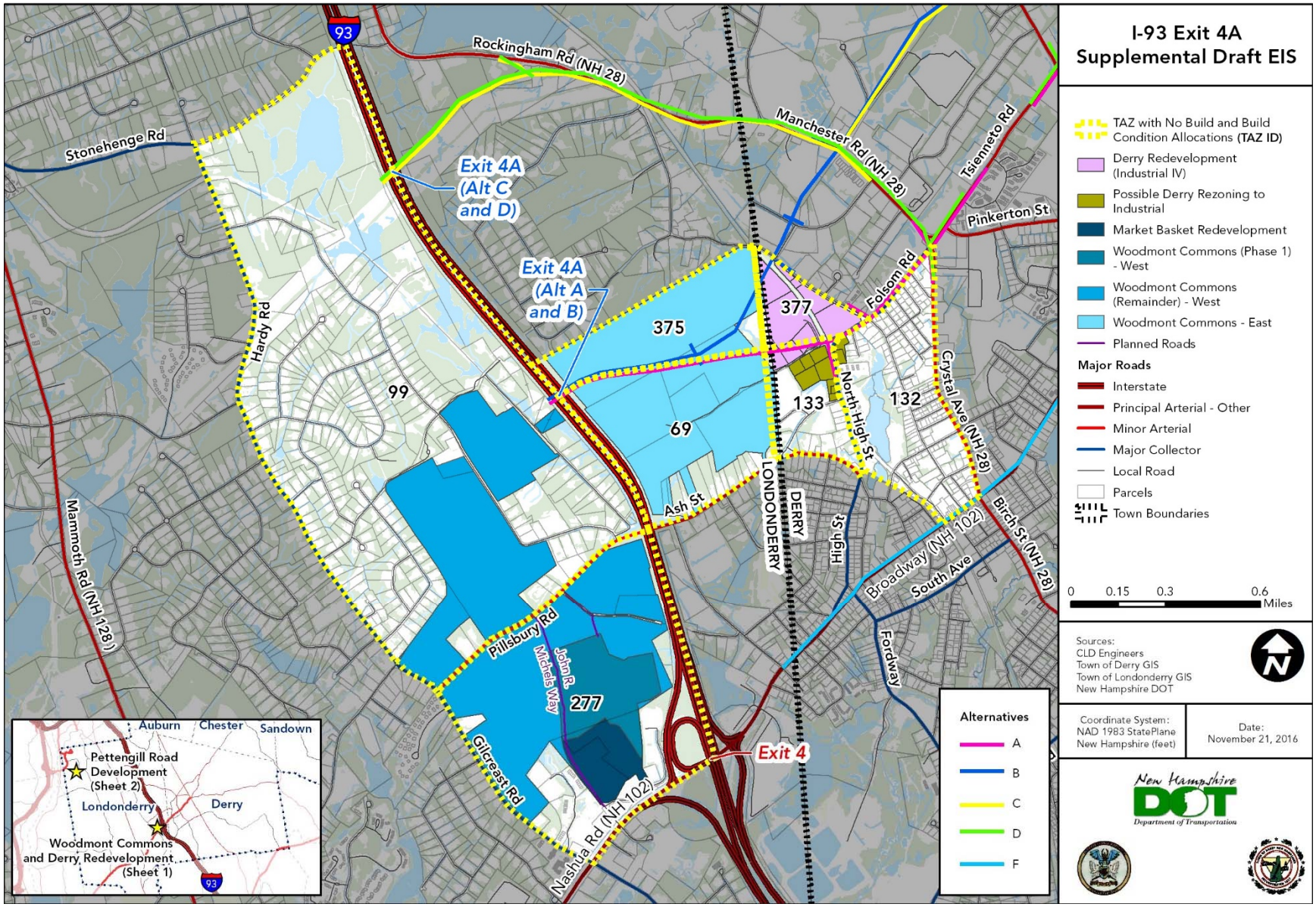

Figure 5 (Sheet 1 of 2). TAZs with No Build and Build allocations

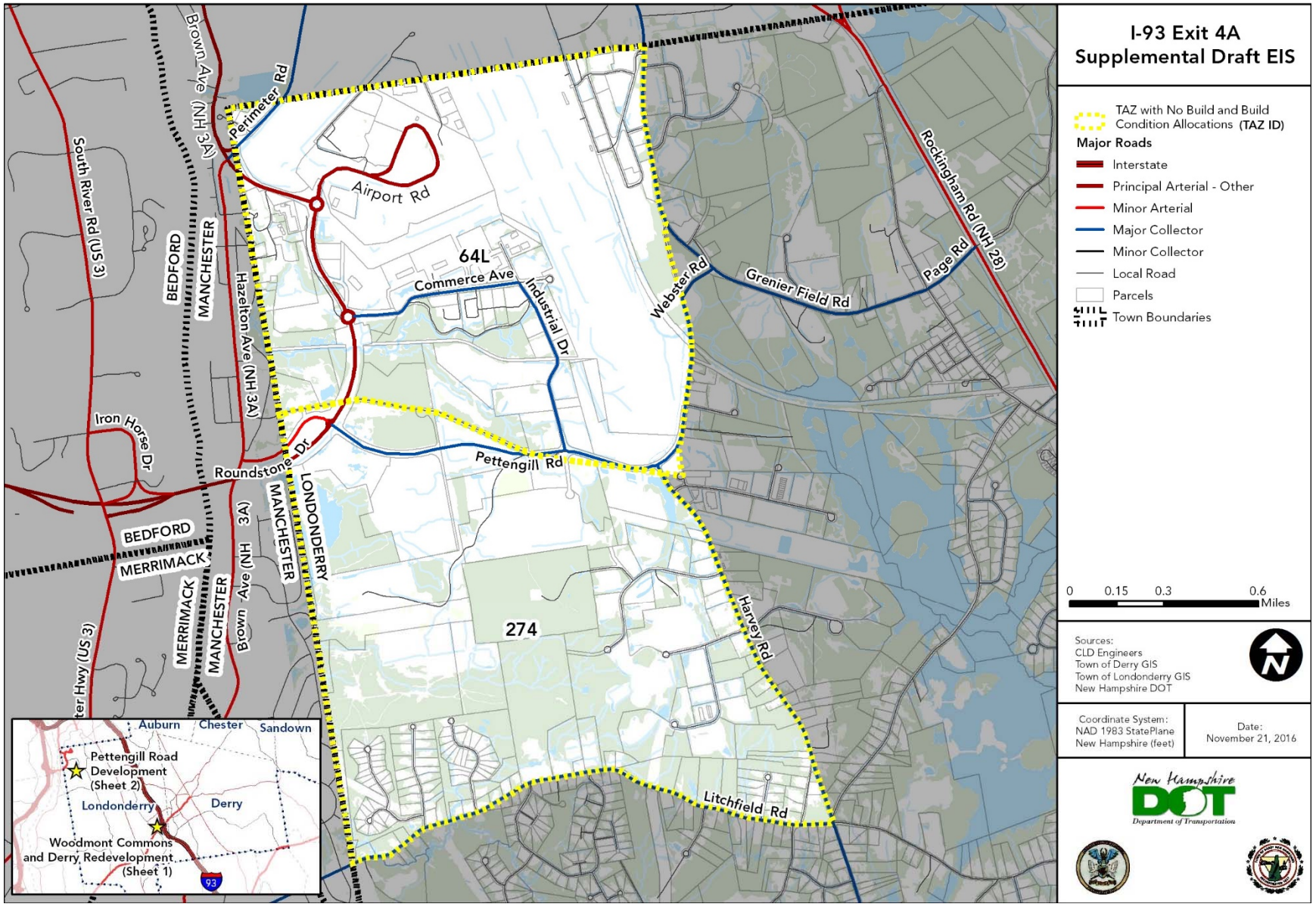

Figure 5 (Sheet 2 of 2). TAZs with No Build and Build allocations

Table 25. 2040 Build condition by TAZ

Municipality	TAZ	2040 Total No Build Condition			2040 Incremental Build Condition Growth (Alternative A)			2040 Total Build Condition		
		Population	Households	Employment	Population	Households	Employment	Population	Households	Employment
Derry	132	773	339	CI	0	0	14	773	339	CI
Derry	133	85	29	CI	0	0	106	85	29	CI
Derry	377	13	3	CI	0	0	226	13	3	CI
Londonderry	64L	0	0	CI	0	0	0	0	0	CI
Londonderry	69	594	205	CI	5	2	1,866	599	207	CI
Londonderry	99	1,698	588	CI	9	3	575	1,707	591	CI
Londonderry	274	405	118	CI	0	0	0	405	118	CI
Londonderry	277	2,166	757	CI	8	3	526	2,174	760	CI
Londonderry	375	381	133	CI	3	1	1,368	384	134	CI
Auburn[a]	NA	NA	NA	NA	0	0	0	NA	NA	NA
Chester	148	796	275	CI	121	40	0	917	315	CI
Chester	149	632	225	CI	126	42	0	758	267	CI
Chester	150	566	220	CI	204	68	0	770	288	CI
Chester	151	624	223	CI	144	48	0	768	271	CI
Chester	152	1,535	448	CI	241	80	0	1,776	528	CI
Chester	153	526	180	CI	103	34	0	629	214	CI
Chester	154	635	229	CI	93	31	0	728	260	CI
Chester	155	938	277	CI	85	28	0	1,023	305	CI
Sandown[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	NA	12,368	4,250	CI	1,142	380	4,681	13,510	4,630	CI

Notes: TAZs in this table are those that include population, household, and employment growth from known developments under the No Build condition or incremental growth associated with the Build condition (Alternative A). The whole-town TAZ tables for the entire study area are included in Appendix D. SNHPC background employment data by TAZ is confidential and not available for publication. CI = Confidential Information

[a] Auburn is listed as NA because there are no known developments or induced growth anticipated; therefore, population, households, and employment were not allocated to TAZs.

[b] The anticipated induced population and household growth for Sandown was not assigned to TAZs because Sandown is located in an external zone in the traffic demand model.

Table 24 shows the incremental population, household, and jobs growth based on the anticipated indirect land use effects of Alternative A. As detailed in Appendix D, the Project would result in the most indirect land use effects under Alternatives A and B, less indirect land use effects under Alternatives C and D, and no anticipated indirect land use effects under Alternative F. The projected indirect land use effects of Alternatives A and B are from the difference in the development approved and expected for Woodmont Commons development with and without the Project, the difference in development on the recently rezoned parcels in the Town of Derry along Folsom Road, and anticipated residential development in the Towns of Chester and Sandown based on improved access to I-93. The projected indirect land use effects of Alternatives C and D are only from the anticipated residential development in the Towns of Chester and Sandown based on improved access to I-93.

The travel demand modeling and traffic impact analyses will utilize the socioeconomic data results of this study as an input, and the details of these analyses will be documented separately in the Traffic and Transportation Technical Report.

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APPENDIX A: LOCAL LAND USE PLANNER INTERVIEW SUMMARIES AND SUPPLEMENTAL INFORMATION

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Local Land Use Planner Interview Summaries and Supplemental Information

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I-93 Exit 4A Supplemental Environmental Impact Statement

Land Use Planner Interview Summary – Final 08/05/16

Town of Derry

Following is a summary of the interview held on July 26, 2016 at the Town of Derry offices. Attendees were as follows:

- Town of Derry – George Sioras, Liz Robidoux, and Mike Fowler
- Louis Berger – Leo Tidd and Kerri Snyder
- RKG Associates – Craig Seymour

Population and Employment

The 2010 Comprehensive Plan includes dated population data, and the staff referenced the Granite State Future Project, which resulted in the SNHPC's Moving Southern New Hampshire Forward Regional Comprehensive Plan (2015).[1] This report included a 2015 population for Derry between 31,991 (SNHPC) and 33,991 (OEP) (see Attachment A). The decline from previously projected population numbers is based on school age families migrating away from the area, young adults who leave Derry to attend college or seek employment and settle elsewhere, and an aging population.

There was a general discussion of SNHPC's population projections and the towns input. The SNHPC projections include a straight-line assumption and do not consider individual transportation and land development projects. The Derry staff believe that growth generated by Exit 4A would be in addition to the SNHPC projections. In other words, the SNHPC projections would be representative of a "No Build" condition for Exit 4A in Derry.

The staffs provided additional information on population and growth through a school district facilities committee meeting report (see Attachment B).

Transportation

Regarding the general discussion of how Exit 4A would affect Derry's plan for transportation facilities and services, if Exit 4A were built, it would make improvements on local roads accessing the exit. If Exit 4A were not built, the Town would have to evaluate how to address transportation needs.

Exit 4A would reduce travel times for residents and business travelers during the afternoon rush hour ingress to Derry. The project is not likely to make a difference for the morning rush hour egress from Derry, as travelers already find other routes to take. There is anecdotal evidence of collateral impacts in that residents report too much traffic or traffic traveling too fast on the more rural roadways southeast of downtown Derry. For example, to avoid Exit 4 and the traffic congestion on Route 102 through Downtown, some commuters leave I-93 at Exit 3 instead and

[1] http://www.snhpc.org/pdf/SNHPCRegionCompPlan2015.pdf

take the Route 111 bypass into the southern portion of Derry, followed by navigation northward through Derry on local streets.

The staff discussed the effect of Exit 4A on traffic in downtown Derry. Derry is a "cut-through" town for towns farther to the east (e.g., Chester, Sandown) as drivers access I-93. By providing an alternative route for through-traffic, Exit 4A would alleviate the severe peak hour traffic congestion on Route 102 through downtown Derry, which some believe would be beneficial in terms of economic impacts because it would improve the accessibility to downtown businesses. Others believe that reduced traffic in downtown Derry would result in loss to businesses. The Town of Derry does not have an official position on this issue and has recommended additional study of the benefits and impacts of Exit 4A in the 2010 Comprehensive Plan.

Parts of Derry are primarily built-out, and the staff view the major impacts associated with not building Exit 4A as additional stress on state roads, as there are constraints that preclude expansion of these other roadways to four-lane facilities.

Development and Land Use

Since 1990, the explosive growth experienced since the 1960s slowed. Derry's growth management ordinance was instituted in the mid-1990s along with changes in zoning to control density of residential development. In addition, the segmented ownership in the central business district and lack of large parcels of available land for development make substantial growth impracticable. Currently, Derry is experiencing a trend of population decline related to an aging population and an outward migration of young adults as they seek employment and educational opportunities.

The area immediately to the east of I-93, along Folsom Road north of High Street, has been rezoned to encourage higher quality industrial and commercial development near the proposed Exit 4A. There are also residential areas south of Folsom Road and North High Street that might be re-zoned to Industrial/Commercial zoning. The Derry staff indicated Exit 4A could have an effect on the timing and intensity of development/redevelopment in this small industrial-zoned area. Effects on commercial/industrial development in other areas of the Town are not anticipated. The commercial zoning district along the southern end of Rockingham Road (Route 28) was revised in 2013, and there has been some commercial development in that area. In addition, water and sewer services are being expanded along Rockingham Road (Route 28) to continue to encourage commercial development along that corridor.

Although there are no large parcels suitable for large-scale developments, there is a 13-apartment building of market rate apartments planned near the central business district. The staff indicated on the maps provided where the areas had been rezoned to encourage commercial and industrial development as well as the limits of municipal water and sewer service (Attachment C). Beyond the eastern limits of water service, there are private water companies that tie into the Town, but there is no sewer service. The limits of water and sewer service, the lack of large parcels, and the topography in the eastern portion of Derry, serve to limit development. Lot size requirements and conserved land are also factors constraining any major single-family home developments in Derry. Due the large number of development constraints, Derry staff suggested

that any indirect impacts of Exit 4A on residential development would be more likely to occur in other outlying towns such as Chester, Auburn and Sandown.

The Granite State Future Project is the latest in comprehensive planning for Derry, and the Town's comprehensive plan will most likely be updated in 2020.

Community and Quality of Life

Derry is considered a large town in New Hampshire, yet it still maintains its small town, cohesive character. There is a good sense of community in Derry. The staff cited a recent election to overturn austere budget cuts because the residents want a "full-service" community – for example, they want police and fire service, rather than a volunteer fire department.

The quality of life has improved in Derry over the last 25 years. The growth management ordinance was successful in limiting development, and Derry no longer suffers issues associated with explosive growth (e.g., overcrowded schools). Although some of the retail development Derry used to have is no longer present, the downtown is starting to be revitalized, and the Manchester Road/Crystal Avenue area is beginning to redevelop. There are sufficient plans and policies in place – zoning, capital improvements plan – to maintain Derry's quality of life in the future.

The staff stated that the Exit 4A project would have no effect on the provision, financing, or accessibility of community services. The primary benefit to Derry would be reduced traffic congestion through Downtown, although as noted previously above, some believe that a reduction in traffic downtown has the potential for negative effects on existing businesses.

POPULATION PROJECTIONS

Municipality	2000 Census	2010 Census	2015 OEP	2015 SNHPC	2020 OEP	2020 SNHPC	2025 OEP	2025 SNHPC	2030 OEP	2030 SNHPC	2035 OEP	2035 SNHPC
Auburn	4,682	4,953	5,006	5,137	5,117	5,288	5,229	5,519	5,320	5,712	5,366	5,983
Bedford	18,274	21,203	22,449	22,242	23,967	23,243	24,473	24,121	24,859	24,816	25,061	25,409
Candia	3,911	3,909	3,834	4,191	3,799	4,420	3,883	4,601	3,950	4,726	3,985	4,810
Chester	3,792	4,768	5,204	5,097	5,717	5,404	5,842	5,711	5,944	5,982	5,996	6,239
Deerfield	3,678	4,280	4,524	4,571	4,828	4,839	4,935	5,114	5,020	5,344	5,064	5,561
Derry	34,021	33,109	31,991	33,881	31,189	34,400	31,876	34,931	32,429	35,195	32,711	35,416
Goffstown	16,929	17,651	17,774	18,171	18,084	18,663	18,467	19,162	18,757	19,583	18,910	19,942
Hooksett	11,721	13,451	14,028	14,159	14,713	14,809	15,074	15,431	15,381	15,961	15,565	16,432
Londonderry	23,236	24,129	24,154	25,132	24,453	26,082	24,991	27,267	25,425	28,438	25,646	29,925
Manchester	107,006	109,565	109,308	112,395	110,163	114,895	112,493	117,555	114,263	119,351	115,191	120,724
New Boston	4,138	5,321	5,872	5,582	6,502	5,796	6,639	6,120	6,744	6,403	6,799	6,795
Raymond	9,674	10,138	10,197	10,593	10,373	11,424	10,601	11,918	10,785	12,261	10,879	12,705
Weare	7,776	8,785	9,192	9,497	9,708	10,183	9,913	10,857	10,069	11,464	10,151	12,013
Windham	10,709	13,592	14,890	14,502	16,408	15,320	16,769	16,239	17,060	17,061	17,208	17,774
Total	**259,547**	**274,854**	**278,423**	**285,151**	**285,021**	**294,765**	**291,185**	**304,548**	**296,006**	**312,296**	**298,532**	**319,725**

A-4

DERRY COOPERATIVE SCHOOL DISTRICT #1
FACILITIES COMMITTEE MEETING

May 27, 2015
6:30 PM

AGENDA

- **Welcome**
- **Population Presentation: George Sioras**
- **Facilities/Space Presentation: Jane Simard and Gary Webster**

NEXT MEETING: June 8th and June 24th at 6:30 PM at West Running Brook Middle School.

As we move forward all requests for information will be made through the facilitator. This will be an important process to observe to ensure the process runs as smoothly as possible. The Facilitator will be Dr. John Moody. Dr. Moody can be reached at jhmschool@comcast.net.

George Sioras

From: George Sioras
Sent: Wednesday, June 24, 2015 10:09 AM
To: Dan McKenna (84mckenna@gmail.com); CHarper@pinkertonacademy.org; debcovino@gmail.com
Cc: jhmschool@comcast.net; Laura Nelson; George Sioras
Subject: Population/Growth-Town of Derry Planning Department summary for subcommittee-Facilities Committee

A component of our subcommittee's work was to review future population growth and demographics in the town. Reviewing the growth patterns from the past 50 years as well the current development in town and a future build-out including the expansion of Interstate 93 and the potential Exit 4A, our subcommittee came to the conclusion the growth rate has peaked for the town and will most likely not peak again and how these changes would impact the school system.

Several factors have and will continue to have an impact on the future school population. The primary change has been in the zoning for the town. Zoning changes that began in the late 1990s now have lowered the density for single family lot sizes throughout town. Where in the past most of the town allowed for one-acre lots the requirement today is for one, two, and three-acre minimum lot size for single-family housing. This change has significantly lowered the number of new homes being built in comparison to the large housing developments of the 1960s, 1970s, and 1980s.

Another more recent zoning change has been in the reduction of the density of multi-family apartments, townhouses, and condominiums. As the town saw large scale multi-family developments beginning in the 1960s through the 1980s the most recent zoning change this past year has significantly reduced the density allowance for this type of housing. This zoning has and will significantly alter future multi-family housing particularly in the older, more compact neighborhoods of West Derry and the Downtown area which is serviced by municipal sewer and water and is a mandatory requirement in the zoning that multi-family housing shall be connected to the town's utility systems.

A third reason for less population in the future is the changing demographics of both the town and state. Our demographics show an aging population which is reflected in both the 2000 and 2010 Census. Both state and regional planning agencies who monitor and project future growth patterns see this aging population trend to continue well into the future over the next three decades as well as a smaller growth rate in the younger population age group from birth up to young adulthood.

A final factor contributing to the lower population growth of the town since the 1990s has been the preservation of open space, purchase of parcels of land and easements which reduces the amount of land that would have been potentially a housing development.

As is highlighted in the Town's 2010 Master Plan which was adopted by the Planning Board the demographic and socio-economic trends that face a community are generally the keystone to the major decisions that need to be made in regards to issues such as economic development, land use, housing and growth and thus in turn impact the school system as well.

January 2014 to present

Apartments/Townhouses Approved

26232	20 townhouses	Floyd School/Highland Avenue
23016	9 townhouses	Brook Street
24037	18 apartments	Magnolia Lane/Kendall Pond
27137	5 townhouses	Barka – South Avenue
(also 30012 & 30013)		
24005	13 Apartments	Keystone Bldrs – Kendall Pond Road

65 Units
34 townhouses
31 apartments

Lots Approved

04094	Sederquist	1 lot	Whitney's Grove Road
05074	Murdoch	1 lot	Lane Road
04038-005	Mark Young	1 lot	Gulf Road
08066 & 08067	Solomini	1 lot	Tsienneto Road
09045	Donahue	8 lots	Beaver Lake Road and Old Chester Road
04075	Cella	2 lots	Cella Drive
04084	BR-10	11 lots	Gulf Road/Bartlett Road

25 lots, single family residential

Completed

10024/10015	Harvest Estates	30 lots	Hampstead Road/Harvest Drive

Single family residential

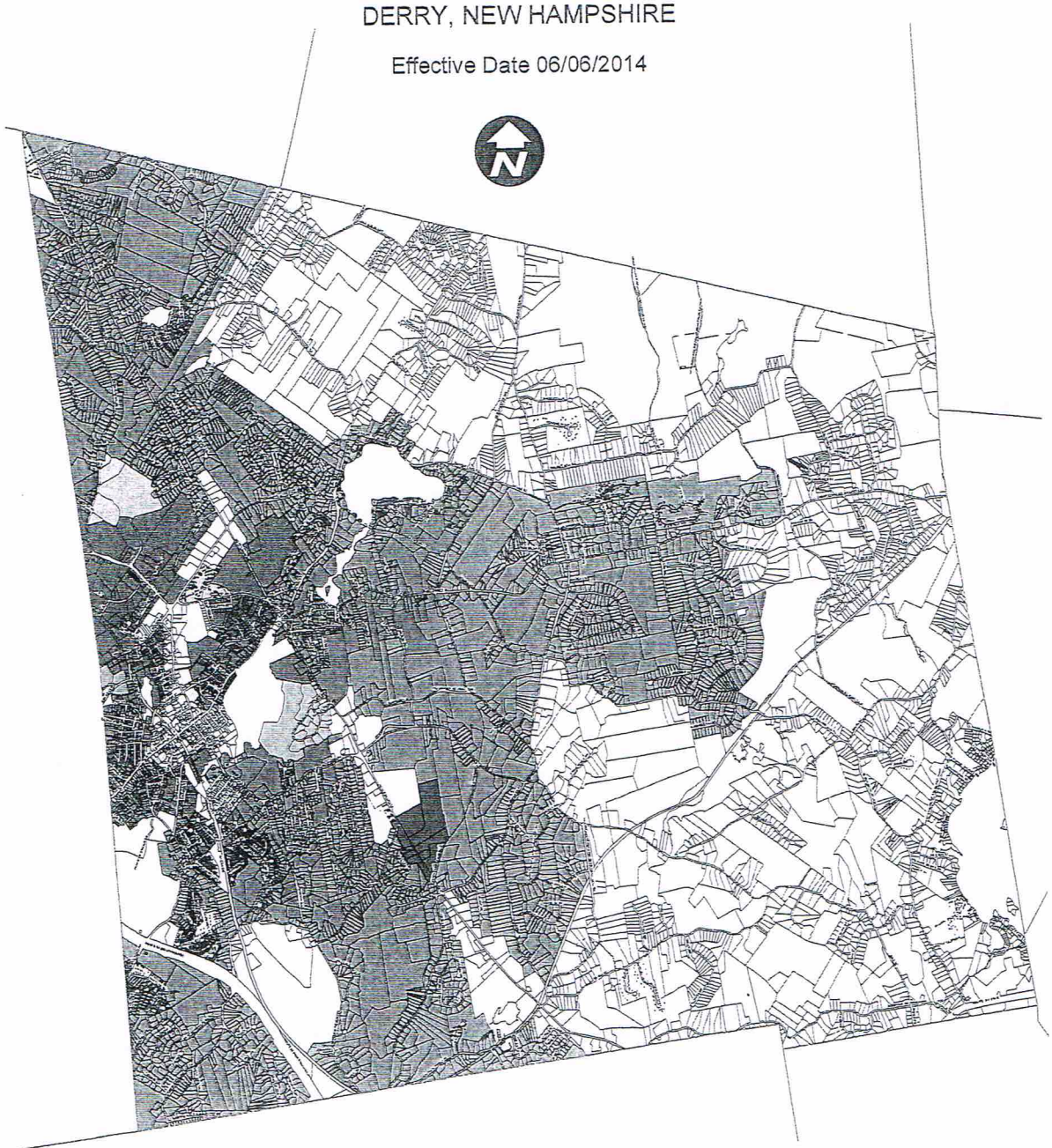
55+ Housing

02020	Bunker Estates	115 Units	Fordway	almost completed
04003	Indian Hill Estates	26 Units	Kilrea Road	

ZONING

DERRY, NEW HAMPSHIRE

Effective Date 06/06/2014



Zones

- IND1-INDUSTRIAL I
- IND II-INDUSTRIAL II
- IND III-INDUSTRIAL III
- IND IV-INDUSTRIAL IV
- IND V-INDUSTRIAL V
- IND VI-INDUSTRIAL VI
- LDR-LOW DENSITY RESIDENTIAL
- LMDR-LOW/MED DENSITY RESIDENTIAL
- MDR-MEDIUM DENSITY RESIDENTIAL
- MHDR II-MEDIUM HIGH DENSITY RESIDENTIAL
- MHDR-MEDIUM/HIGH DENSITY RESIDENTIAL
- GC-GENERAL COMMERCIAL
- GC2-GENERAL COMMERCIAL II
- GC3-GENERAL COMMERCIAL III
- CBD-CENTRAL BUSINESS DISTRICT
- MFR-MULTI-FAMILY RESIDENTIAL
- MHPD-MANUFACTURED HOUSING PARK DEVELOPMENT
- OBD-OFFICE BUSINESS DISTRICT
- OMB-OFFICE MEDICAL BUSINESS
- ORD-OFFICE RESEARCH AND DEVELOPMENT

DERRY, NEW HAMPSHIRE
GEOGRAPHIC INFORMATION SYSTEM

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For copies of meeting minutes and other related documentation, please contact SNHPC.

SNHPC

POPULATION

The SNHPC's 2010 population of 261,262 represents an increase of approximately 5 percent since 2000. This compares to New Hampshire's 6.5 percent increase from 2000 to 2010 and a 9.7 percent increase nationally. The SNHPC region had 105,829 total households in 2010. The tables below show the Region's historical and projected population growth.

Historic Population

Municipality	1960	1970	1980	1990	2000	2010
Auburn	1,292	2,035	2,883	4,085	4,682	4,953
Bedford	3,636	5,859	9,481	12,563	18,274	21,203
Candia	1,490	1,997	2,989	3,557	3,911	3,909
Chester	1,053	1,382	2,006	2,691	3,792	4,768
Deerfield	714	1,178	1,979	3,124	3,678	4,280
Derry	6,987	11,712	18,875	29,603	34,021	33,109
Goffstown	7,230	9,284	11,315	14,621	16,929	17,651
Hooksett	3,715	5,564	7,303	9,002	11,721	13,451
Londonderry	2,457	5,346	13,598	19,781	23,236	24,129
Manchester	88,282	87,754	90,936	99,332	107,006	109,565
New Boston	925	1,390	1,928	3,214	4,138	5,321
Raymond	1,867	3,003	5,453	8,713	9,674	10,138
Weare	1,420	1,851	3,232	6,193	7,776	8,785
Total	121,066	138,355	171,978	216,479	248,838	261,262

Sources: 1960-2010 Population from the U.S. Census

Population Projections

Municipality	2010	2015	2020	2025	2030	2035	2040	2045	2050
Auburn	4,953	5,187	5,288	5,519	5,712	5,983	6,226	6,569	6,937
Bedford	21,203	22,242	23,243	24,121	24,816	25,409	25,886	26,226	26,689
Candia	3,909	4,191	4,420	4,601	4,726	4,810	4,855	4,896	4,949
Chester	4,768	5,097	5,404	5,711	5,982	6,239	6,437	6,613	6,759
Deerfield	4,280	4,571	4,839	5,114	5,344	5,561	5,740	5,888	6,061
Derry	33,109	33,881	34,400	34,931	35,195	35,416	35,215	34,821	34,473
Goffstown	17,651	18,171	18,663	19,162	19,583	19,942	20,142	20,301	20,435
Hooksett	13,451	14,159	14,809	15,431	15,961	16,432	16,790	17,113	17,157
Londonderry	24,129	25,132	26,082	27,267	28,438	29,925	31,477	33,354	35,435
Manchester	109,565	112,395	114,895	117,555	119,351	120,724	121,235	121,960	122,723
New Boston	5,321	5,582	5,796	6,120	6,403	6,795	7,201	7,578	7,990
Raymond	10,138	10,593	11,424	11,918	12,261	12,705	13,000	13,427	13,767
Weare	8,785	9,497	10,183	10,857	11,464	12,013	12,472	12,888	13,275
Total	261,262	270,650	279,446	288,308	295,235	301,951	306,675	311,634	316,650

Sources: 2010 U.S. Census, SNHPC Population Projections

A PDF file of additional tables and charts related to population growth in the SNHPC region is also available to download.

Additional tables and charts related to population growth in the SNHPC region is also available here.

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Chapter 2
DEMOGRAPHIC TRENDS

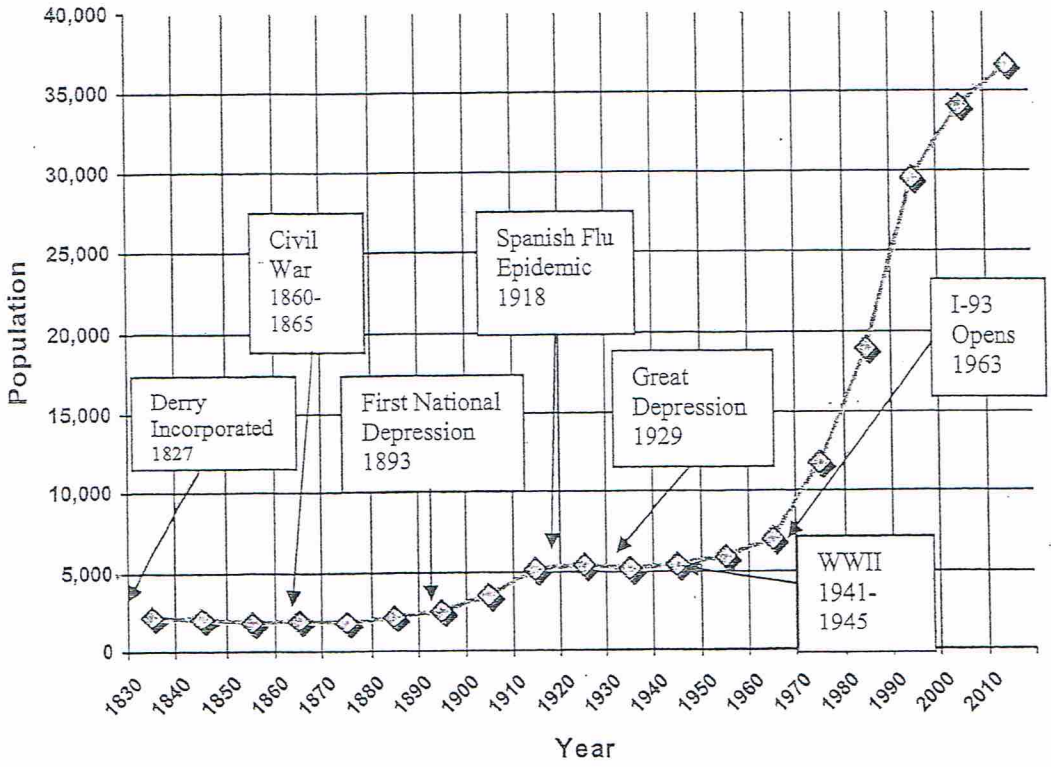
2.0 INTRODUCTION

The demographic and socio-economic trends that face a community are generally the keystone to the major decisions that need to be made in regards to issues such as economic development, land use, housing and growth.

This chapter will focus on all the different aspects of demographic trends, Population, Housing and Economic development. Comparisons between other towns, the county and the state will provide context and understanding of how Derry is doing overall within the region.

2.1 POPULATION GROWTH TRENDS

Figure 2.1: Historical Population, Town of Derry



2.2 POPULATION GROWTH PROJECTIONS

There are an estimated 34,071 people in Derry as of 2008 and with the expansion of I-93, Derry can expect to experience more growth in the coming years, with a projected population of 40,430 in 2030 according to the Office of Energy and Planning. It is important that we plan well for this anticipated growth so that it follows the goals and objectives the town has outlined and so the intensity, patterns, and mix of land uses create a well-balanced, healthy and sustainable community.

Table 2.3 below shows projected populations for Derry, the County, and the State from 2008 through 2030 from the New Hampshire Office of Energy and Planning (NH OEP). These projections are based on the 2000 census and local projections are based on a community's historical share of its respective county's growth.

Table 2.3: Growth Projections 2007-2030

	2008[2]	2010	2015	2020	2025	2030
Derry	34,071	36,560	37,860	38,980	39,730	40,430
Rockingham County	295,525	308,200	320,500	331,200	341,870	351,690
New Hampshire	1,315,000	1,365,140	1,420,000	1,470,010	1,520,310	1,565,040

Source: NH Office of Energy and Planning

Table 2.4 below shows a comparative analysis of the NH OEP projections and those done by the Southern New Hampshire Planning Commission (SNHPC). The Commission methodology includes more localized data and assumptions about the Town and its surrounding area than does the OEP Procedure. The Commission makes its projections based on natural growth and net migration. The differences in projections are different by about 1%, but because the Commission's procedures are more sensitive to local situations the use of these results are recommended.

Table 2.4: Comparative Projections for Derry, 2010 - 2030

	SNHPC	NH OEP	% Difference
2010	37,283	36,560	-1.02%
2015	35,406	37,860	0.94%
2020	36,471	38,980	0.94%
2025	38,101	39,730	0.96%
2030	39,998	40,430	0.99%

Source, NH OEP Projections, SNHPC Projections

[2] NH OEP Estimates

Derry, New Hampshire

The Population by Sex and Age

Females

Age Cohorts	Census 2000	Census 2010	Percent Change
0 to 4	1,164	952	-18%
5 to 9	1,471	986	-33%
10 to 14	1,550	1,150	-26%
15 to 19	1,216	1,285	6%
20 to 24	856	1,035	21%
25 to 29	1,162	1,005	-14%
30 to 34	1,462	986	-33%
35 to 39	1,834	1,218	-34%
40 to 44	1,678	1,418	-16%
45 to 49	1,398	1,640	17%
50 to 54	1,042	1,442	38%
55 to 59	619	1,118	81%
60 to 64	443	833	88%
65 to 69	358	520	45%
70 to 74	334	330	-1%
75 to 79	205	282	38%
80 to 84	111	227	105%
85+	240	246	3%
TOTAL	17,144	16,674	-3%

Males

Age Cohorts	Census 2000	Census 2010	Percent Change
0 to 4	1,268	948	-25%
5 to 9	1,599	1,076	-33%
10 to 14	1,446	1,304	-10%
15 to 19	1,307	1,376	5%
20 to 24	833	1,126	35%
25 to 29	1,160	921	-21%
30 to 34	1,372	957	-30%
35 to 39	1,782	1,128	-37%
40 to 44	1,642	1,300	-21%
45 to 49	1,374	1,564	14%
50 to 54	1,059	1,504	42%
55 to 59	781	1,104	41%
60 to 64	373	851	128%
65 to 69	272	563	107%
70 to 74	285	287	1%
75 to 79	158	177	12%
80 to 84	73	132	81%
85+	93	117	26%
TOTAL	16,877	16,435	-3%

Combined Total Population

Age Cohorts	Census 2000	Census 2010	Percent Change
0 to 4	2,432	1,900	-22%
5 to 9	3,070	2,062	-33%
10 to 14	2,996	2,454	-18%
15 to 19	2,523	2,661	5%
20 to 24	1,689	2,161	28%
25 to 29	2,322	1,926	-17%
30 to 34	2,834	1,943	-31%
35 to 39	3,616	2,347	-35%
40 to 44	3,321	2,718	-18%
45 to 49	2,772	3,204	16%
50 to 54	2,101	2,946	40%
55 to 59	1,400	2,222	59%
60 to 64	816	1,684	106%
65 to 69	630	1,083	72%
70 to 74	619	617	0%
75 to 79	363	459	26%
80 to 84	184	359	95%
85+	333	363	9%
TOTAL	34,021	33,109	-3%

MEDIAN AGE

Both sexes	33.6	38.2	14%

THE POPULATION 18 YEARS AND OVER

Total:	23767	24942	5%
Male	11681	12213	5%
Female	12086	12729	5%

THE POPULATION 21 YEARS AND OVER

Total:	22611	23659	5%

THE POPULATION 62 YEARS AND OVER

Total:	2590	3839	48%
Persentage in Total Population	8%	12%	4%

THE POPULATION 65 YEARS AND OVER

Total:	2103	2881	37%
Male	865	1276	48%
Female	1238	1605	30%
Percentage in Total Population	6%	9%	3%

RACE

Total:	34021	33109	-3%
Population of one race:	33635	32538	-3%
White	32676	31301	-4%
Black or African American	305	326	7%
American Indian and Alaska Native	71	80	13%
Asian:	362	513	42%
Asian Indian	114	169	48%
Chinese	73	119	63%
Filipino	31	51	65%
Japanese	22	21	-5%
Korean	68	56	-18%
Vietnamese	26	25	
Other Asian	28	72	
Native Hawaiian and Other Pacific Islande	16	12	
Native Hawaiian	10	8	
Guamanian or Chamorro	1	4	
Samoan	0	0	
Other Pacific Islander	5	0	
Some Other Race	205	306	49%
Population of Two or More Races	386	571	48%

RACE (TOTAL RACES TALLIED)

White alone or in combination with one or more other races	33032	31846	-4%
Black or African American alone or in combination with one or more other races	399	507	27%
American Indian and Alaska Native alone or in combination with one or more other races	189	261	38%
Asian alone or in combination with one or more other races	460	659	43%
Native Hawaiian and Other Pacific Islander alone or in combination with one or more other races	19	28	47%
Some Other Race alone or in combination with one or more other races	337	403	20%

HISPANIC OR LATINO BY SPECIFIC ORIGIN

Total:	34021	33109	-3%
Hispanic or Latino (of any race):	643	1080	68%
Mexican	94	177	88%
Puerto Rican	223	372	67%
Cuban	29	46	59%
Other Hispanic or Latino	297	485	63%
Not Hispanic or Latino	33378	32029	-4%

RELATIONSHIP

Total:	34021	33109	-3%
In households:	33790	32907	-3%
Householder	12327	12537	2%
Spouse	6948	6569	-5%
Child	11701	10411	-11%
Own child under 18 years	9669	7469	-23%
Other relatives	1049	1446	38%
Under 18 years	363	534	47%
Nonrelatives	1765	1944	10%
Unmarried partner	933	1105	19%
In group quarters:	231	202	-13%
Institutionalized population:	160	150	
Noninstitutionalized population:	71	52	-27%

Derry, New Hampshire

The Population by Sex and Age

Females

Age Cohorts	Census 2000	Census 2010	Percent Change
0 to 4	1,164	952	-18%
5 to 9	1,471	986	-33%
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Combined Total Population

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THE POPULATION 18 YEARS AND OVER

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Female	12086	12729	5%

THE POPULATION 21 YEARS AND OVER

Total:	22611	23659	5%

THE POPULATION 62 YEARS AND OVER

Total:	2590	3839	48%
Persentage in Total Population	8%	12%	4%

THE POPULATION 65 YEARS AND OVER

Total:	2103	2881	37%
Male	865	1276	48%
Female	1238	1605	30%
Percentatge in Total Population	6%	9%	3%

RACE

Total:	34021	33109	-3%
Population of one race:	33635	32538	-3%
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Black or African American	305	326	7%
American Indian and Alaska Native	71	80	13%
Asian:	362	513	42%
Asian Indian	114	169	48%
Chinese	73	119	63%
Filipino	31	51	65%
Japanese	22	21	-5%
Korean	68	56	-18%
Vietnamese	26	25	
Other Asian	28	72	
Native Hawaiian and Other Pacific Islande	16	12	
Native Hawaiian	10	8	
Guamanian or Chamorro	1	4	
Samoan	0	0	
Other Pacific Islander	5	0	
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Asian alone or in combination with one or more other races	460	659	43%
Native Hawaiian and Other Pacific Islander alone or in combination with one or more other races	19	28	47%
Some Other Race alone or in combination with one or more other races	337	403	20%

HISPANIC OR LATINO BY SPECIFIC ORIGIN

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Other relatives	1049	1446	38%
Under 18 years	363	534	47%
Nonrelatives	1765	1944	10%
Unmarried partner	933	1106	19%
In group quarters:	231	202	-13%
Institutionalized population:	160	150	
Noninstitutionalized population:	71	52	-27%

George Sioras

From: George Sioras
Sent: Monday, May 16, 2016 9:29 AM
To: Susan Hickey; Barbara Chapman
Cc: Stephen Daly
Subject: RE: Questions for Moody's

Hi Sue,

Here is the information regarding development over the last 18 months. The past two years have been the most busy in the Planning and Building Departments since 2008. I have highlighted various projects and the status of them as well listed the number of new building lots approved by the Planning Board and permits issued by the Building Department. As you will see it has been steady in our departments. In the past we have forwarded this information to the folks at Moody's in advance so when they call in and have asked me questions they have the information in advance which is helpful Just a suggestion.

George

Non-residential development.

1. 72,000 sf self-storage facility-under construction.
2. 45.000 sf self-storage facility-work to begin this summer.
3. Auto custom exhaust garage-work to begin this summer.
4. Cumberland Farms expansion and store façade improvements-completed.
5. 16-bed Assisted Living Facility-under construction.
6. 7,000 sf addition to an Industrial building/summer beach products-work to begin this summer.
7. New landscaping business-under construction.
8. 40,000 sf retail development, Crystal Place, Phase I site work-work to begin this summer.
9. 34,000 sf retail development, Cowbell Corner, Phase I gas station/convenience store-under construction.

Residential development.

1. 65 units of townhouse and apartments which includes 34 townhouses and 31 apartments. All are under construction
2. 40 new single-family house lots approved by the Planning Board. In various stages of permitting.
3. Building-Code Enforcement Office issued 26 residential permits for 2015 and so far to May, 2016, 46 permits will have been issued.

There has been a couple of new economic development initiatives this past year. The Town has extended municipal water and sewer to Route 28 (Rockingham Road) which is a major arterial road which is zoned Commercial with the hope of expanding the town's tax base with future development in this part of town. Also the town has recertified and expanded our existing Economic Revitalization Zones located on Route 28, Manchester Road and Crystal Ave. which incorporate our largest commercial and industrial districts of the town. These zones encourage development and redevelopment opportunities that improve infrastructure and create jobs. New and expanding businesses in these areas are eligible to apply for tax credits against the NH Business Profits Tax and/or the Business Enterprise Tax as administered by the State of New Hampshire Department of Resources and Economic Development.

Lastly, the school enrollment continues to see yearly decreases in the student population and is projected to continue into the next five years. I am a member of the School District's Facilities Study Committee and the Committee has spent

the last year and a half looking at the district's need for the future. A final report is expected to be completed in June, 2016, and presented to the School Board. In general the enrollment decline is reflective to many communities in New Hampshire which is an aging state, smaller population growth from past decades and less children being born. Even with the residential development cited above the enrollments numbers will not match previous enrollment numbers from the high residential development rates seen during the 1970, 1980s, and 1990s both in Derry and the State of New Hampshire.

From: Susan Hickey
Sent: Friday, May 13, 2016 9:20 AM
To: Barbara Chapman; George Sioras
Subject: Questions for Moody's

Good morning,

Please have all information ready for our Moody's interview by Tuesday morning.

Thanks,
Sue

Susan A. Hickey
Chief Financial Officer
Town of Derry, NH
14 Manning Street
Derry, NH 03038
(603) 845-5421

DERRY COOPERATIVE SCHOOL DISTRICT ENROLLMENT PROJECTIONS 5 Year Average Method

Grade	15-16 (Actual)	16-17	17-18	18-19	19-20	20-21
K	299	263	253	253	262	258
1	342	320	320	308	308	319
2	357	332	315	315	303	303
3	397	353	340	322	322	310
4	381	390	353	340	322	322
5	381	384	394	356	343	325
6	385	383	392	402	363	350
7	410	393	391	400	410	371
8	433	405	400	398	407	417
Total K-8	3385	3223	3158	3094	3040	2975

Total K-5	2157	2042	1975	1894	1860	1837
Total 6-8	1228	1181	1183	1200	1180	1138

From:	George Sioras
To:	Snyder, Kerri; Elizabeth Robidoux; Mike Fowler
Cc:	Tidd, Leo; Chris Bean; Hodgson (Rydland), Laura; I93-Exit4A-EIS (SM)
Subject:	RE: I-93 Exit 4A: Possible Industrial Development in Derry
Date:	Thursday, September 15, 2016 7:40:37 AM

Good Morning Kerri,

The revisions look great. I will also keep you updated as we move along with the potential zoning amendments with the Planning Board and Town Council. Thanks.

George

From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Wednesday, September 14, 2016 6:44 PM
To: George Sioras; Elizabeth Robidoux; Mike Fowler
Cc: Tidd, Leo; Chris Bean; Hodgson (Rydland), Laura; I93-Exit4A-EIS (SM)
Subject: RE: I-93 Exit 4A: Possible Industrial Development in Derry

George,

Based on our conversation on September 13, attached is a revised map showing the parcels in the vicinity of Alternative A that have been recently rezoned as Industrial 4 (north side of Folsom Road), developed parcels zoned as Industrial 6 (south side of Folsom Road), and parcels currently zoned as Medium High Density Residential that will be studied in the coming months to determine if they should be rezoned to Industrial 4 or Industrial 6.

It is my understanding that the Town Council is anticipated to ask the Planning Board to undertake a study of whether or not these parcels should be rezoned. The request is likely to come in late September, and the study would likely take about one year to complete.

I appreciate your review of and comments on the attached map and the information provided in this e-mail regarding the upcoming study.

Regards,
Kerri

From: Snyder, Kerri
Sent: Tuesday, September 06, 2016 2:12 PM
To: 'George Sioras' <georgesioras@derrynh.org>; 'Elizabeth Robidoux' <elizabethrobidoux@derrynh.org>; 'Mike Fowler' <mikefowler@derrynh.org>
Cc: Leo Tidd (ltidd@louisberger.com) <ltidd@louisberger.com>; Chris Bean <ChrisB@cldengineers.com>; Laura Hodgson (Rydland) (lhodgson@louisberger.com) <lhodgson@louisberger.com>; I93-Exit4A-EIS (SM) (I93-Exit4A-EIS@louisberger.com) <I93-Exit4A-EIS@louisberger.com>
Subject: I-93 Exit 4A: Possible Industrial Development in Derry

George, Liz, and Mike,

Based on our interview on July 26, 2016, we understand that the Town of Derry anticipates that

recently rezoned parcels along Folsom Road north of High Street may be redeveloped if Alternative A remains the preferred alternative for Exit 4A.

Attached is a map showing parcels, zoning, and the 2007 DEIS alignments for Alternatives A and B for your review and comment. Would you please comment on or confirm the following?

- The extent of the existing industrial parcels that could experience development or redevelopment as a result of Exit 4A.
- The extent of the existing residential parcels that could be rezoned as industrial to take advantage of the connector road frontage access to Exit 4A.
- List or mark-up the map to let us know of any parcel numbers that should be added or deleted based on what is shown in the attached map.

The results will be used to help identify industrial development that could be induced by the proposed project and will be included in the Land Use Scenarios Technical Report.

If you think a discussion is in order, please let me know what dates and times work for you, and I can call you to discuss the map and possible redevelopment in more detail. Thank you for your time in reviewing the map and providing input as we develop the Build and No Build Scenarios for the technical report.

Regards,
Kerri

Kerri Snyder, AICP
Principal Environmental Planner | Transportation Planning and Environment
Louis Berger
48 Wall Street, 16th Floor | New York | NY | 10005 | USA
direct +1-212-612-7908
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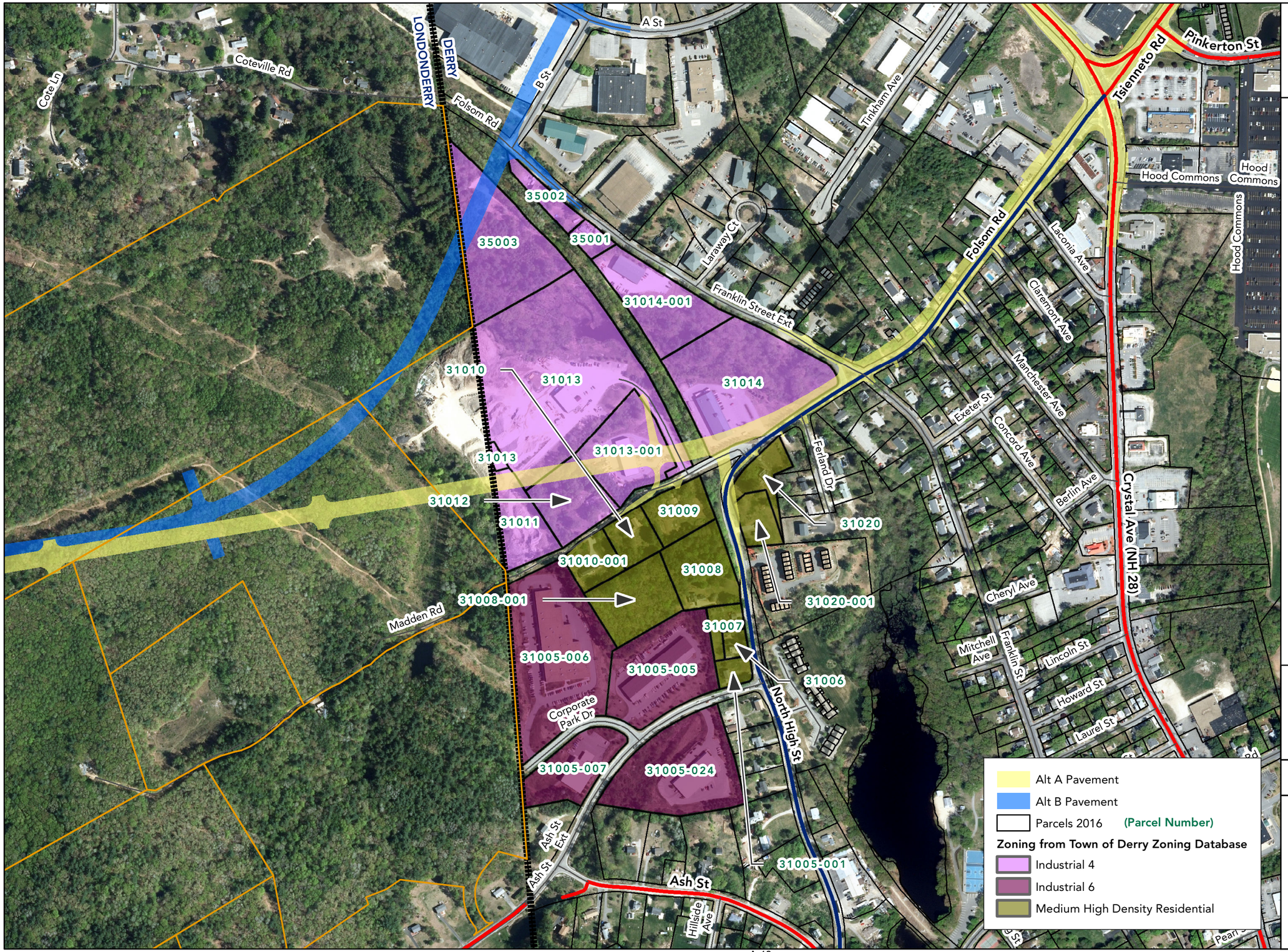
I-93 Exit 4A

Zoning Redevelopment Area
Revised Map September 14



Town Boundaries
Parcels 2016

Major Roads

Minor Arterial
Major Collector
Local Road

Woodmont Commons

0 145 290 580 Feet

Sources:
CLD Engineers
Town of Derry GIS
Town of Londonderry GIS
New Hampshire DOT

Coordinate System:
NAD 1983 StatePlane
New Hampshire (feet)

Date:
September 14, 2016

New Hampshire DOT
Department of Transportation

I-93 Exit 4A Supplemental Environmental Impact Statement

Land Use Planner Interview Summary Final - 8/8/2016

Town of Londonderry

Following is a summary of the interview held on July 25, 2016 at the Town of Londonderry office. Attendees were as follows:

- Town of Londonderry – Colleen Mailloux and John Vogl
- Louis Berger – Leo Tidd and Kerri Snyder
- RKG Associates – Craig Seymour

Population and Employment

There was a general discussion of SNHPC's population projections and the towns input. The SNHPC projections include a straight-line assumption. Although, Londonderry is currently in a growth phase, the planners believe the 2020 population projection (31,688) included in the Town's 2013 Comprehensive Plan is ambitious.

The Pettengill Road development is industrial and would not contribute to population growth. The Woodmont Commons development has a large residential share and would help push the town toward the 2020 population projection of 31,668. If Woodmont Commons were not built out, the Town's population would likely be lower than projected though it is understood that other projects would likely take its place on the same parcels.

The Town participated in reviewing SNHPC's population projections presented in the 2013 Comprehensive Plan; however, to date, they have not reviewed any subsequent projections. The I-93 Exit 4A project would contribute to growth by providing access to undeveloped land on the east side of I-93. Such growth is understood to be generally non-residential in nature.

Transportation

The Exit 4A project would provide access to the eastern portion of Woodmont Commons. Woodmont Commons will be making some transportation improvements on the west side based on the Development Agreement for Phases I and II. Phase I includes five restaurants, an entertainment venue, and commercial/retail space with residential units on the higher floors. The design plans for Phase I are located on the Town's website.[1] Phase II is planned to expand upon the development built during Phase I and would include additional single-family residential areas and additional commercial uses west of I-93. These phases of Woodmont Commons would proceed regardless of the Exit 4A project. The planners provided the Woodmont Commons traffic study for Phases I and II of the development (Traffic Impact and Access Study – Woodmont Commons PUD Phases I and II, June 2016). As part of the Development Agreement, the agreed upon transportation improvements would be paid for by the developer prior to receiving building permits.

[1] http://www.londonderrynh.org/Pages/LondonderryNH_BComm/Planning/projectsunderreview/

The Town does not have other major transportation projects planned. Based on the planning process for the 2013 Comprehensive Plan, bicycle and pedestrian trail connectivity is a high priority for the community, including the potential regional trail crossing near the eastern extent of the Exit 4A preferred alternative alignment. This is a vital link connecting trail networks in both Londonderry and Derry. At this time, no bicycle trails outside of the PUD study area are in development. However, the Woodmont Commons PUD states that accommodations for bicycles will be provided along or parallel to the Primary Street Network of the development and that shared use of streets will be permitted for all other portions of the development.

Exit 4A would not substantially alter travel times on the west side of I-93; it may improve the travel times on roadways east of I-93, including Pillsbury Road/Ash Street (two-lane facility). The planners do not anticipate major changes in travel patterns or transportation needs for Londonderry associated with the Exit 4A project.

Development and Land Use

Since 2000, the explosive growth experienced in the 1980s and 1990s has slowed, and the current development trends are based on access to undeveloped or underdeveloped land and presence or absence of municipal services (water/sewer), which affects the density of development. For example, the industrial development occurring on Pettengill Road is driven by undeveloped land with access to Raymond Weiczorek Drive (Manchester Airport Access Road). It is not affected by the Exit 4A project. The planners indicated limits of municipal water and sewer access on the maps provided to indicate the limits for higher density development (Attachment B). The planners also indicated on the maps provided the most likely locations in Londonderry for growth outside of the planned Woodmont Commons area. On the east side of I-93, Exit 4A would likely affect the timing and type of growth – the interchange and connector road would provide access and opportunity for commercial, institutional and higher density residential development.

The Woodmont Commons development density with and without Exit 4A was discussed, and the planners indicated that the "without Exit 4A" scenario presented in the approved 2013 PUD was based on design review meetings that included Town staff, project engineers/planners and the Town's review consultant. Thus, the PUD with and without 4A scenarios should not be construed as projections of growth, but rather provide an upper cap on the maximum amount of development that could occur. This explains why less commercial development is allowed on the west side of I-93 without Exit 4A than with Exit 4A, even though Exit 4A would provide no westerly access.

With regard to development associated with Build Alternatives A, B, C, D, and F, the planners stated that growth in Londonderry under Alternatives C and D would be more in line with a No Build Alternative in that they would not provide access to the parcels planned to be developed by Woodmont Commons for commercial and/or institutional use. Given the easterly-only access of Exit 4A, development of the interchange will likely have little effect on the job growth or attraction of industries to the west of I-93. The effects would most likely be experienced east of I-93.

To promote the villages and corridors growth scenario outlined in the 2013 Comprehensive Plan, the planners indicated that higher density development along the transportation corridor is generally acceptable, and the development permitting process allows the villages and corridors growth scenario to happen organically. While the Town is undertaking a zoning update, the planners do not foresee major changes to the way that parcels are currently zoned.

Community and Quality of Life

The Town of Londonderry has retained its rural character as it has grown into more of a suburban rural community with high quality schools and rising property values. The industrial development in the northwestern portion of the Town (near the airport) is distribution-based and has increased in value as technology has improved. Through the master planning process, the Town committed to keep the residential areas as residential. Londonderry aims to improve connectivity of its open space and recreational resources by adding bicycle and pedestrian trails.

Exit 4A would provide the opportunity for commercial development, and as a result, an enhanced tax base. The planners indicated that the Exit 4A project would not result in net negative effects on the quality of life or community character because the development impacts will be mitigated through the requirements of the development agreement and the PUD (e.g. traffic mitigation measures as additional phases go through site plan review). Exit 4A would have no effect on the provision, financing, or accessibility of community services.

From:	Snyder, Kerri
To:	"Colleen Mailloux"
Cc:	Leo Tidd (ltidd@louisberger.com); Chris Bean; Laura Hodgson (Rydland) (lhodgson@louisberger.com); I93-Exit4A-EIS (SM) (I93-Exit4A-EIS@louisberger.com)
Subject:	Market Basket redevelopment area
Date:	Tuesday, September 20, 2016 10:22:00 AM

Colleen,

Thank you for providing information regarding the four additional pad sites in the Market Basket redevelopment area. Based on your voicemail, I understand that the four pad sites have not been approved for development. Although they have currently been put aside, based on previous communications you have had with DeMoulas Supermarkets, Inc., it sounds like they have considered a combination of restaurant uses for three of the pads and bank/office/retail for the remaining pad. Based on this, it is possible that they could get about 20,000-30,000 gsf of commercial development from those four pads.

I appreciate your review of and comments on this information.

Regards,
Kerri

Kerri Snyder, AICP
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I-93 Exit 4A Supplemental Environmental Impact Statement

Land Use Planner Interview Summary- *Draft- 8/2/2016*

Southern New Hampshire Planning Commission

Following is a summary of the interview held on July 25, 2016 at the SNHPC office in Manchester. Attendees were as follows:

- SNHPC – Julie Chen, Adam Hlasny, and Jack Munn
- Louis Berger – Leo Tidd and Kerri Snyder
- RKG Associates – Craig Seymour

Population and Employment

SNHPC has provided whole-town and zonal (traffic analysis zone [TAZ]) population projections for Derry and Londonderry through 2050 using the cohort-component method. An overview of the SNHPC methodology is provided in a letter provided to the project team by SNHPC (see Attachment A: Letter to George Sioras dated March 14, 2012, regarding population and dwelling unit projections). To generate population cohort and dwelling unit projections for 5-year increments (e.g., 2015, 2020, 2025) for the TAZs, SNHPC uses the following information:

- Birth and death rates from NH Department of Health and Human Services
- Region survival rates using a life table derived from OEP
- SNHPC's own projection of net migration, four scenarios were analyzed (high, middle, low and historical average).
- available land within the TAZs
- housing information/building permits from the towns and OEP

The SNHPC provides letters to each of the Towns (see Attachment A) to gain their input on the population projections.

SNHPC also makes projections for employment based on quarterly employment averages from the State, compared to building permit data to estimate the number of jobs per square foot of non-residential development.

The methods used for the 2015 employment projections differ from those used for the 2010 population projections. The 2010 projections used an ELMI employer database to identify number of employees per company, which were then assigned to the appropriate TAZs; however, this information is not currently available for 2015.

The Moving Southern New Hampshire Forward Plan (2015) mentions I-93 Exit 4A being constructed by 2024, and the travel demand model includes the Exit 4A project as discussed in the following section. However, the SNHPC population projections do not consider additional growth associated with individual transportation or development projects (e.g., Exit 4A/Woodmont Commons). Rather, these population projections through 2050 are considered background growth.

Transportation

The Moving Southern New Hampshire Forward Plan (2015) considers individual projects that could affect regional transportation (e.g., I-93 widening) in developing the Future Build traffic volumes. As part of a scenario planning effort, the traffic modeling includes a Fast Build Scenario and a Continued Slow Growth Scenario on a regional level, and the individual projects that would contribute to higher traffic volumes (e.g. potential development induced by Exit 4A/Woodmont Commons, and Pettengill Road are considered to be captured in the Future Fast Build Scenario.

There was a general discussion of the proposed splitting of TAZs in Derry and Londonderry based on the proposed Woodmont Commons development. CLD Engineers proposed the splits (see Attachment B) and will provide additional input so that SNHPC can move forward with the 2015 base year updates for the SDEIS. The same TAZ structure will be used for the base year and all future analysis years.

SNHPC provided a technical report that documents the development and calibration of the 2010 travel demand forecast model (Attachment C).

Development and Land Use

Commercial and industrial growth is transportation based. I-93 Exit 4A could improve access for economic development; however, other factors including available land and zoning also play a role in the location of the development.

Expanding the Community Technical Assistance Program (CTAP) through I-93 is listed as a strategic initiative in the SNHPC Regional Plan. Phases I and II of the program were strategic initiatives. Phase III of the CTAP is pending and being coordinated with NHDOT. SNHPC is considering a town survey to gauge needs. For example, SHNPC is currently assisting the Town of Chester with its impact fees program. SNHPC wants to determine needs in the other towns it serves to find out how to make the CTAP most effective.

Regional Planning Activities

SNHPC’s 2015 Regional Comprehensive Plan has been released. Based on State statutes, the next official update of the comprehensive plan would be in 2020. The next SNHPC planning product will be the housing needs assessment.

Other Topics

SNHPC provided suggested contacts with other nearby towns for follow-up questions or information.

March 14, 2012

Mr. George Siroas, AICP, Director
Derry Planning Department
14 Manning Street
Derry, NH 03038

Re: Population and Dwelling Unit Projections

Dear Mr. Sioras:

The Southern New Hampshire Planning Commission (SNHPC) has completed the new population and dwelling unit projections for the region's towns and traffic zones. The projections look at the years 2010 - 2050. At this point, we would like to share our results with you for your review and comments.

The 2010 US Census counted population for Derry was 33,109. According to the SNHPC figures, the number of dwelling units in Derry was 13,277. The SNHPC projected population for 2050 is 34,437, an absolute change of 1,328 persons, and the projected number of dwelling units is 14,926, an absolute change of 1,649 units. These projections represent annual compound growth rates of 0.10 percent and 0.29 percent respectively. Please see the attached tables for details on a five-year basis.

The population projection was conducted using the Cohort Component Method. The actual births and deaths used were obtained from the NH Department of Health and Human Services, Bureau of Vital Records. The regional survival rates were calculated using life table derived from Office of Energy and Planning (OEP). The one variable generated by the SNHPC was the projected net migration. Using the past 40 years of net migration, we projected four possible future net migration outcomes: high, middle, low, and historical average. The most probable of the four was selected to generate the final projection; for Derry we used our low net migration projection.

Dwelling Units were projected based on the annual average of the past 40 years of Building Permits issued (1970 - 2009). The OEP figures from their "Current Estimates and Trends in New Hampshire's Housing Supply, Updates 1989, 1999 and 2009" were used along with "1970-1979 Estimates of Housing Supply for Towns and Counties in New Hampshire." The building permit data was analyzed and any years with atypical net dwelling unit increases were excluded from the calculation of the annual average. For Derry, the annual average of net dwelling unit increase used in the projection was 42.

Using the totals from the population and dwelling unit projections, the net increase expected for each projected five year increment was distributed to the various traffic zones. Please refer to

the attached traffic zone map for the location of zone boundaries. General assumptions made in this process were that growth rates would remain constant in each traffic zone and zoning ordinances would not change significantly over the projected time span. More specific assumptions were made in determining the amount of growth each traffic zone would receive based on the existing zoning of vacant land, the quantity of vacant land, the location of wetlands, steep slopes, water bodies or other natural development constraints, the existing land use coverage, the planned development area from SNHPC Comprehensive Plan; and the known proposed developments.

In Derry, the following assumptions were made to distribute the dwelling unit increases to the individual traffic zones:

- Traffic zones 147, 128, 123, and 140 would receive the greatest share of dwelling units given the combination of higher density zoning and quantity of buildable residential land, and the residential construction trend of 1990 - 2010 was to build in these zones.
- Traffic zones 124, 125, 126, 221, 222, and 223 would receive the least amount of dwelling units due in the case of zone 125 to a lack of residential zoned land, and in the other zones there is little vacant land to support growth other than infill development, despite zoning for the highest densities allowed.

Distribution of population increases to the individual traffic zones were in proportion to dwelling unit increase in the individual traffic zones.

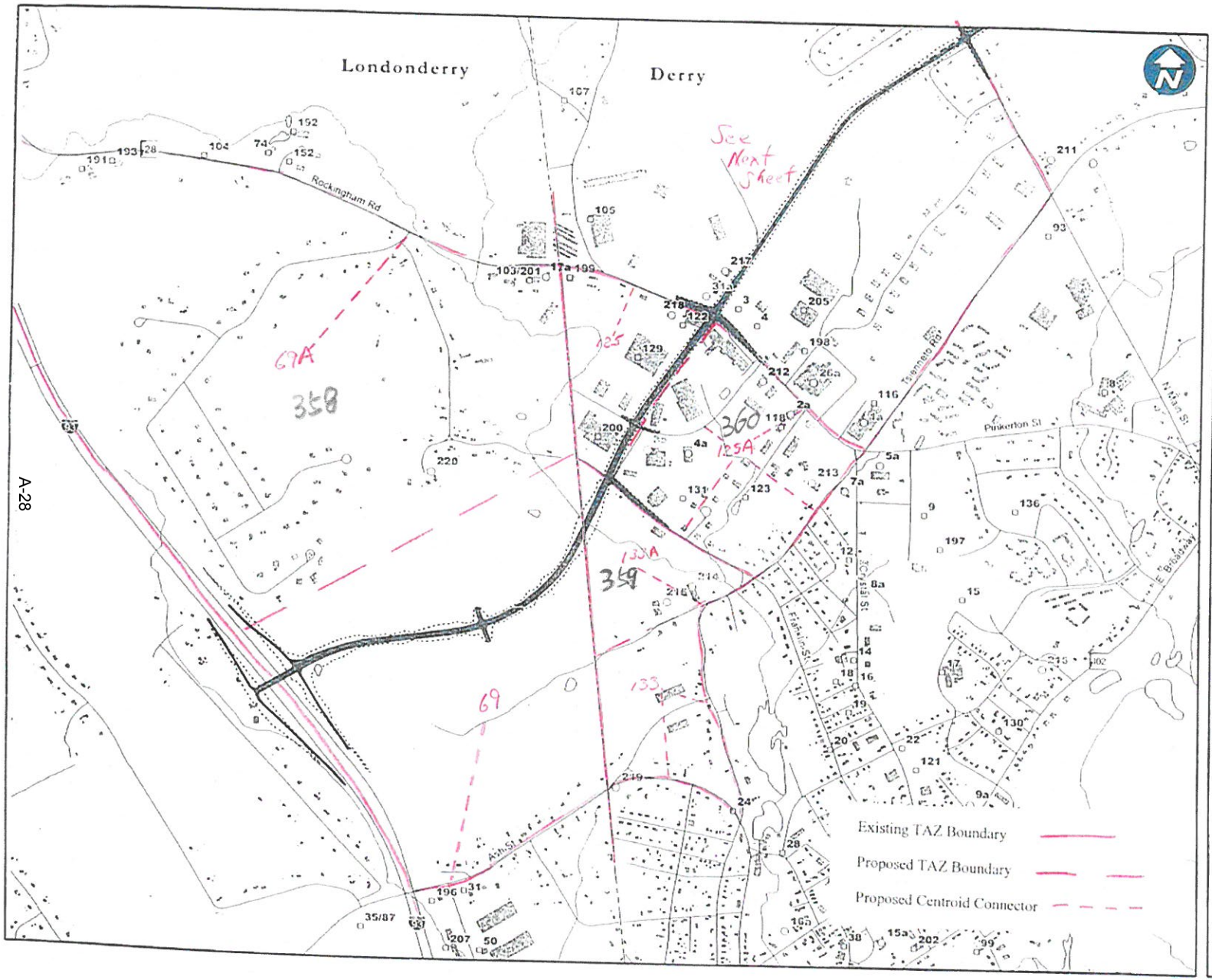
Please review the information in this letter along with the attached supporting tables. We greatly welcome your comments so that our projections will best reflect Derry's future growth. If you have comments or suggested revisions, please contact Julie Chen, Ph.D. within the next two weeks at (603) 669-4664 or jchen@snhpc.org. We would be happy to schedule an appointment to sit down with you and review the data in more detail. If we do not hear from you in the next three weeks, we will assume you are comfortable with our projections.

Sincerely,

SOUTHERN NEW HAMPSHIRE
PLANNING COMMISSION

David J. Preece, AICP
Executive Director/CEO

cc: SNHPC Representatives:
Ann Marie Alogni; Frank Bartkiewitz; Brian Chirichiello; Darrell Park.



I-93 Exit 4A Interchange Study
Draft Environmental Impact Statement

Figure 4.11-3
Potential Petroleum, Hazardous Materials Sites, and Solid Waste Sites for Alternative B

Legend

Hazardous Material Sites
- High
- Moderate/High
- Moderate
- Low
- Not Rated

Area of Disturbance
Proposed Pavement Layout
Study Area
Building
Road
Stream
Town Boundary

Note

The Not Rated designation is meant to identify those locations that have not been ranked for hazardous materials concerns because the site was deemed (after conducting database research, windshield surveys and coordinating with the NHDOT Hazardous Materials Coordinator) to not warrant further review due to the site condition or physical location/distance from the remaining corridors

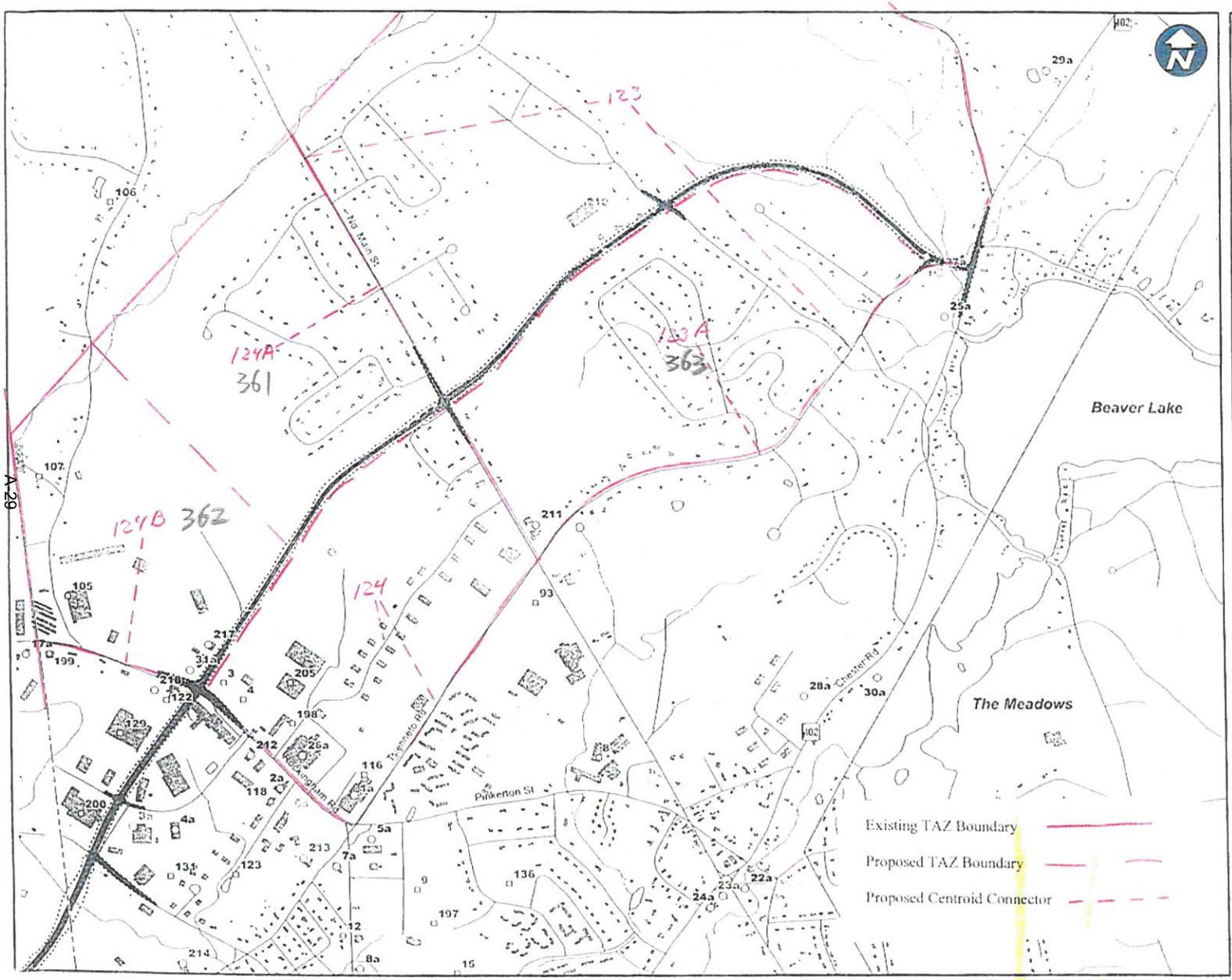
Data Sources

Hazardous material data were compiled by CLD Consulting Engineers, Inc. (CLD) personnel and a professional data search service, Environmental Data Resources, Inc. (EDR) of Southport, CT. Searches performed by EDR and CLD personnel include reviews of both the Federal and State Regulatory Agency databases identified by the American Society of Testing and Materials (ASTM). The date of EDR's review is October 26, 2005. CLD completed a windshield survey to re-confirm existing conditions on February 15, 2006.

0 1,000 2,000 Feet

CLD Consulting Engineers

WOODLOT Environmental



I-93 Exit 4A Interchange Study
Draft Environmental Impact Statement

Figure 4.11-4
Potential Petroleum, Hazardous Materials Sites, and Solid Waste Sites for Alternative B

Legend

Hazardous Material Sites
- High
- Moderate/High
- Moderate
- Low
- Not Rated

Area of Disturbance
Proposed Pavement Layout
Study Area
Building
Road
Stream
Town Boundary

Note

The Not Rated designation is meant to identify those locations that have not been ranked for hazardous materials concerns because the site was deemed (after conducting database research, windshield surveys and coordinating with the NHDOT Hazardous Materials Coordinator) to not warrant further review due to the site condition or physical location/distance from the remaining corridors.

Data Sources

Hazardous material data were compiled by CLD Consulting Engineers, Inc. (CLD) personnel and a professional data search service, Environmental Data Resources, Inc. (EDR) of Southport, CT. Searches performed by EDR and CLD personnel include reviews of both the Federal and State Regulatory Agency databases identified by the American Society of Testing and Materials (ASTM). The date of EDR's review is October 26, 2005. CLD completed a windshield survey to re-confirm existing conditions on February 15, 2006.

2010 TRAVEL DEMAND FORECAST MODEL DEVELOPMENT AND CALIBRATION REPORT FOR

THE SOUTHERN NEW HAMPSHIRE PLANNING COMMISSION

July 2012

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CHAPTER 1 INTRODUCTION

1.1 Overview

The development and calibration of the 2010 Southern New Hampshire Planning Commission (SNHPC) 24-hour model includes many refinements. This report describes the model and documents the calibration and validation process.

The 2010 model includes all regional roadways of functional class of collectors and higher as well as some local roads. The region was divided into 290 traffic analysis zones and 67 external stations where traffic enters and leaves the region. The model projects average weekday 24-hour traffic volume for roads in the region.

The SNHPC model is used to perform analyses such as:

- Roadway system deficiencies
- Level of service
- Air quality conformity
- Long range transportation planning
- Transportation improvement program
- Special studies

1.2 Household Travel Survey

SNHPC contracted with the University of New Hampshire Survey Center to conduct a household travel survey for the region. The 2007 household travel survey collected travel information for respondents on Tuesday, Wednesday, and Thursday during October and November 2007. In addition to providing basic demographic information about each household and its members, the survey documented specific travel characteristics of trips, including number of vehicle occupants, trip purpose, time of day, and trip mode. The survey included 786 households selected randomly from the region's telephone records. The survey data was analyzed by SNHPC using Microsoft Access. The following products from the analysis were used to develop model factors:

- Average number of vehicles available per household per community

- Vehicle – Person cross-classification tables
- Percentage of internal to external trips expressed as a percentage of total trips
- Auto occupancy rates by trip type
- Trip length (duration) frequency by trip type

1.3 Demographics

Travel survey data and demographic data are essential to developing travel demand models. The demographic data as model inputs includes population, households, number of vehicle available per household, school enrollment by school type and employment.

1.3.1 Base year (2010) model

Population and Households

Population, Dwelling Unit, Households (2010) for each community used U.S. Census data.

Vehicle Ownership

The number of vehicles available in a household influences travel behavior much like the number of persons in a household. The SNHPC model uses number of vehicles per household per TAZ as a demographic input. Average vehicle ownership from the 2007 travel survey for communities is shown in the following table. Average vehicles per household by community were then assigned to TAZs.

Table 1.1 Average Vehicles per Household

Town	Vehicle	Town	Vehicle
Auburn	2.67	Hooksett	2.00
Bedford	2.40	Londonderry	2.14
Candia	2.50	Manchester	2.71
Chester	1.86	New Boston	2.30
Deerfield	2.76	Raymond	2.23
Derry	2.04	Weare	2.65
Goffstown	2.34		

Student Enrollment

Student enrollment influences the number of trips attracted by schools. Data for 2010 student enrolments for all elementary, middle and high schools in the region were obtained from the New Hampshire Department of Education. College enrollments were collected by contacting the colleges in the region. School addresses were used for assigning a TAZ to an individual school.

Employment

Employment data for 2010 was supplied by the New Hampshire Economic and Labor Market Information Bureau (ELMB). The database contained 8,181 records including business name, address, code of North American Industry Classification System (NAICS) and number of employees by month. Average employment for each employer was calculated by averaging monthly employment and excluding months with atypical employment. For some communities, all schools and government employment were located in one address. For such cases, SNHPC contacted those communities and local school district offices to obtain employment data and address for each school and each community department of the community where different physical addresses existed.

SNHPC maintained a roadway database in Microsoft Access in which roads were broken down by TAZs. With the division of TAZ, the database was updated accordingly. The database was used for assigning a TAZ to each employer. While attempting to assign traffic zones for individual employment records, SNHPC found several mistakes in the 2010 employment database which were subsequently corrected after additional research. Because of these corrections, the SNHPC 2010 employment and the ELMB employment did not match. SNHPC's total employment number for the region was approximately 2.3 percent higher.

As a model input, the employment were grouped based on the NAICS code as shown below.

- Retail: 44 and 45
- Service: 22, 48, 49, 51, 52, 53, 54, 55, 56, 61, 62, 71, 72, 81
- Industrial: 21, 23, 31, 32, 33, 42

- Government: 92
- Agriculture: 11

1.3.2 Future Year

Population and Households

Population projections were developed using the Cohort Component Method. Actual births and deaths used were obtained from the OEP and NH Department of Health and Human Services Bureau of Vital Records. The regional survival rates were calculated using life tables derived from OEP. The one variable generated by the SNHPC was the projected net migration. Using the past 40 years of net migration, we projected four possible future net migration outcomes for each community: high, middle, low, and historical average. The most probable of the four was selected to generate the final projection.

Dwelling Units were projected based on the annual average of building permits issued between 1970 and 2009. The OEP's figures from "Current Estimates and Trends in New Hampshire's Housing Supply, Updates 1989, through 2009," were used along with "1970-1979 Estimates of Housing Supply for Towns and Counties in New Hampshire". The building permit data was analyzed and those years with atypical net dwelling unit increases were excluded from the calculation of the annual average. 2010-2014 projections were based on 2008 annual dwelling unit increase to account for slower growth which has been the trend since the economic downturn.

Future number of households was calculated by population divided by occupied housing units.

Vehicle Ownership

The model assumes that the future average number of vehicles available in a household is consistent with 2010.

Student Enrollment

Student enrollments for future years were projected based on the population of the corresponding age cohorts for elementary school, middle school, high school and college.

Employment

Employment data for 1990-2010 by community and NAICS code was downloaded from the website http://www.nh.gov/nhes/elmi/covempwag_arch.htm (New Hampshire Economic and Labor Market Information Bureau) for the projections. Growth rates were assumed based on historic employment data by categories and the State projection for 2008-2018. The growth rates were applied to the projections.

Using the community totals for each category of employment projections, the net increase expected for each projected five-year increment was distributed to the traffic zones. It was generally assumed that zoning ordinances would not change significantly over the projected time span. More specific assumptions were made in determining the amount of growth of each traffic zone would receive based on the existing zoning of vacant land; quantity of vacant land; location of wetlands, steep slopes, water bodies or other natural development constraints; existing land use coverage; and known proposed developments.

CHAPTER 2 TRIP GENERATION

Trip generation step converts the demographic/land use data into productions and attractions. Households are converted into "production" and employment (retail, service, industrial, government and agriculture, school enrollments) is converted into "attractions". Many pieces of data including much of that gathered from the household travel survey goes into the trip generation step.

2.1 Trip Productions

2.1.1 Person Trip Data

SNHPC has expanded trips from four to six trip types by adding school and social trip types. Trip types are as follows.

- Home Based Work (HBW) : Trips with one end at home and one end at work
- Home Based Shop (HBSH) : Trips with one end at home and one end at a shopping establishment
- Home Based Social (HBSO): Trips with one end at home and one end at a social establishment (i.e. movies)
- Home Based School (HBSCH): Trips with one end at home and one end at a school
- Home Based Other (HBO): One end at home and one end anywhere except work, shopping, school or social
- Non-Home Based (NHB): Neither end of the trip at home

Adding two additional trip types will offer more refinement to the model. The 2007 household travel survey collected the "purpose of the trip" which was used to assign a trip type.

2.1.2 Cross-Classification Tables

Household size and number of vehicles in the household influences person trips by a household. Trip rates from the 2007 household travel survey were found to be lower than national average and adjustments were made based on the national average trip rates per household. The following table shows trip rates by number of vehicles and persons in the household (cross-classification) that were used to generate productions in the model.

Table 2.1 Cross-Classification Trip Table

Vehicles (equal to or greater than)	Vehicle (less than)	Home based work	Home based shop	Home based social	Home based School	Home based other	Non-home based
Greater than 1 persons per household but less than 2							
0	1	0.25	0.56	0.23	0.24	1.27	0.79
1	2	0.86	1.12	0.38	0.24	1.58	1.32
2	3	1.12	0.84	0.43	0.24	1.58	0.78
3	4	1.13	0.85	0.40	0.24	1.58	0.92
4	99	1.88	0.85	0.40	0.24	1.58	0.92
Greater than 2 persons per household but less than 3							
0	1	0.63	0.56	0.23	0.16	1.27	0.79
1	2	0.85	0.83	0.51	0.37	1.72	1.39
2	3	1.39	1.04	0.52	0.37	1.83	2.20
3	4	1.59	0.96	0.58	0.37	1.83	1.47
4	99	2.40	0.96	0.58	0.37	2.03	1.47
Greater than 3 persons per household but less than 4							
0	1	1.26	0.56	0.23	0.41	1.53	1.57
1	2	1.62	0.90	0.47	0.50	1.78	1.82
2	3	1.63	0.87	0.51	0.43	2.32	2.55
3	4	1.75	0.96	0.58	0.39	1.40	2.49
4	99	1.73	0.99	0.63	0.51	1.59	3.61
Greater than 4 persons							
0	1	1.26	0.56	0.47	0.65	1.53	1.84
1	2	1.47	0.56	0.58	0.81	2.12	2.10
2	3	1.50	0.87	0.60	0.88	1.65	2.99
3	4	1.49	0.69	0.40	1.01	1.68	2.77
4	99	2.04	1.00	0.65	0.58	1.91	3.33

2.2 Attractions

Establishment of trip attraction rates by type were initially based on data from NCHRP 365 and the NH I-93 Transit Investment Study. Adjustments were made to better reflect the number of trips by trip type estimated from the 2007 household travel survey. The final set of attraction rates is shown in the table below.

2.2 Trip Attraction Rates by Trip Type

Trip Type	Total Employment	Retail	Service	Government	Industrial	Agriculture	Households
Home Based Work	1.35						
Home Based Shop		5.8					
Home Based Social			0.8	0.22			0.28
Home Based Other		3.0	0.9	0.25	0.25	0.25	0.70
Non-Home Based		4.49	1.13	1.13	0.38	0.38	0.59

School trip rates per student per school type were determined by using the ITE Trip Generation Manual 7th Edition. The trip attraction rates used in the model are shown in the table below.

Table 2.3 Trip Generation Rate of school

Trip Type	Elementary	Middle	High School	College
Home Based School	1.00	1.40	1.50	2.10

2.3 Special Generators

Trips created by individuals living in special facilities such as student dormitory, nursing home and jail are generated using special generators. Manchester Airport was maintained as special generator. The following special generators were in the following TAZs.

1. Manchester Airport (TAZ 64)
2. Southern New Hampshire University dormitory (TAZ 18)
3. Drug Treatment Center (TAZ 34)
4. Hillsborough County Jail in Manchester (TAZ)
5. State Prison for Women in Goffstown (TAZ 286)
6. Saint Anselm College dormitory (TAZ 88)
7. Southern New Hampshire University dormitory (TAZ 118)
8. Saint Anselm College dormitory (TAZ 236)
9. Nursing home in Bedford (TAZ 110)
10. Nursing home in Bedford (TAZ 89)
11. Nursing home in Derry (TAZ 131)
12. Nursing home in Goffstown (TAZ 235)
13. Nursing home in Goffstown (TAZ 87)
14. Nursing home in Manchester (TAZ 19)
15. Nursing home in Manchester (TAZ 7)
16. Nursing home in Manchester (TAZ 38)
17. Nursing home in Manchester (TAZ 52)
18. Nursing home in Manchester (TAZ 28)
19. Nursing home in Manchester (TAZ 29)
20. Nursing home in Manchester (TAZ115)
21. Nursing home in Manchester (TAZ 39)
22. Nursing home in Manchester (TAZ 40)

2.4 External trips

Factors for each trip type were used for split trips into internal to internal (I-I) trips, internal to external (I-X) trips and external to internal (X-I) trips. I-X factors by trip type

and community were calculated using 2007 household travel survey. For very small samples, the number was adjusted during model calibration. The X-I factors for home based work trips were obtained using work place data from the 2000 Census. The non-work trips X-I factors were generated based on the 2000 model factors, professional judgment, reasonable assumptions concerning the trip characteristic of commuters and the use of an interactive process during calibration. The factors used in the model were shown in the following tables.

Table 2.4 Internal to External Factor

TOWN	HBWIX	HBSHIX	HBSOIX	HBSHCIX	HBOIX	NHBIX
Auburn	0.17	0.05	0.17	0.08	0.12	0.13
Bedford	0.36	0.13	0.10	0.08	0.22	0.13
Candia	0.67	0.33	0.17	0.09	0.44	0.12
Chester	0.69	0.50	0.17	0.09	0.17	0.32
Deerfield	0.34	0.56	0.17	0.50	0.67	0.47
Derry	0.57	0.13	0.35	0.27	0.20	0.30
Goffstown	0.43	0.07	0.13	0.06	0.17	0.17
Hooksett	0.42	0.08	0.13	0.06	0.25	0.24
Londonderry	0.57	0.10	0.30	0.20	0.19	0.27
Manchester	0.26	0.07	0.32	0.12	0.11	0.17
New Boston	0.47	0.44	0.32	0.08	0.24	0.36
Raymond	0.67	0.45	0.40	0.08	0.33	0.50
Weare	0.44	0.56	0.50	0.09	0.35	0.50

Table 2.5 External to Internal Factor

TOWN	XIHBW	XIHBSH	XIHBSO	XIHBSCH	XIHBO	XINHB
Auburn	0.28	0.04	0.05	0.00	0.07	0.09
Bedford	0.35	0.28	0.28	0.00	0.28	0.28
Candia	0.26	0.04	0.04	0.00	0.06	0.07
Chester	0.21	0.03	0.02	0.00	0.02	0.07
Deerfield	0.39	0.04	0.03	0.00	0.04	0.06
Derry	0.25	0.35	0.25	0.10	0.30	0.22
Goffstown	0.19	0.05	0.03	0.02	0.06	0.06
Hooksett	0.37	0.30	0.26	0.03	0.26	0.26
Londonderry	0.29	0.40	0.32	0.00	0.30	0.30
Manchester	0.26	0.27	0.19	0.10	0.25	0.25
New Boston	0.32	0.02	0.04	0.00	0.04	0.04
Raymond	0.46	0.30	0.25	0.00	0.06	0.30
Weare	0.32	0.04	0.04	0.00	0.04	0.08

2.5 Trip Generation Results and Conclusions

The following table summarizes the trip generation results before balancing, which count for a regional population of 261,262. The average motorized trip rate per capital is 3.1 which fall in the range of national average. The table productions and attractions reflect total trips generated by the region.

Table 2.6 Unbalanced Motorized Productions and Attractions

Trip Type	Productions	Attractions
Home Based Work	151,600	162,980
Home Based Shop	94,546	91,396
Home Based Social	51,582	90,615
Home Based School	41,290	100,318
Home Based Other	207,600	193,687
Non-Home Based	236,622	231,053
Total	783,244	870,051

CHAPTER 3 TRIP DISTRIBUTION

Trip distribution involves the roadway networks, travel times, and conversion of productions and attractions from the trip generation step into a TAZ level person trip matrix. The data needed for trip distribution comes from the household travel survey.

3.1 Traffic Analysis Zone (TAZ)

TAZs are geographic areas dividing the planning region into relatively similar areas of land use and land activity. Refinements were made to the 2005 existing TAZs to develop the 2010 TAZs. The 2010 census data boundaries land use type, and major physical and transportation boundaries were all considered in the refinement of TAZs. Total TAZs in each community is shown in the following table. No new TAZs were added to the 2005 model TAZ.

Table 3.1 Number of TAZs

COMMUNITY	# OF ZONES	COMMUNITY	# OF ZONES
Auburn	5	Hooksett	12
Bedford	25	Londonderry	28
Candia	9	Manchester	95
Chester	8	New Boston	10
Deerfield	10	Raymond	17
Derry	35	Weare	19
Goffstown	17	**TOTAL**	**290**

3.2 Network

The model network was adopted from 2005 network. Attributes used in the network includes A node, B node, distance, speed, SPDclass, CAPclass, Lanes, Count, KFAC, Town, CNT93, CNT94, CNT94, CNT95, CNT96, CNT97, ONETWOWAY, Type, CNT98, CNT99, CNT01, Totalest05 and Totalest10. Network roadways are functionally classified, including collectors and higher and some local road. To improve forecasting accuracy and meet needs of planning process, Totalest10 (for validation purpose) were added to the network. Network links were examined and inappropriately coded links were corrected based on local knowledge.

3.2.1Functional Class

Function class as an attribute of links were coded in the network. Functional classes used are shown in the following table.

Table 3.2 Functional Class Classification

Rural	
Code	**Descriptions**
01	Principal Arterial – Interstate
02	Principal Arterial –Other
06	Minor Arterial
07	Major Collector
08	Minor Collector
09	Local
Urban	
Code	**Descriptions**
11	Principal Arterial – Interstate
12	Principal Arterial –Other Freeway and Expressway
14	Minor Arterial
16	Major Collector
17	Minor Collector
19	Local

NHDOT GIS data was used to identify roadway functional class.

3.2.2 Facility type

Facility type plays important roles in model calibration.

Network roadways were classified by 16 facility types based on roadway characteristics such as capacity and speed. Capacities were calculated based on 2000 Highway Capacity Manual (HCM) and adjusted during model calibration. Capacity and speed by facility types are presented in table 3.3.

Table 3.3 Facility Type

Code	**Facility Type**	**Description**	**Capacity/lane**	**Speed**
1	Rural interstate and its Ramps connect to freeway.	Include functional class 1.	1920	65
2	Rural Other freeway and expressways	Include functional class 2	1790	65
3	**Entrance Ramp**	**Enter to the freeways**	**720**	**35**
4	**Exit Ramp**	**Exit from freeways**	**720**	**30**
5				
6	Rural Minor Arterial	Include functional class 6	1100	50
7	Rural Major Collector	Include functional class 7	800	45
8	Rural Minor Collector	Include functional class 8	800	40

9	Rural Local Road	Include functional class 9	600	30
11	Urban Interstate and its Ramps connect to freeway.	Include functional class 11.	1870	65
12	Urban Other Freeways and Expressway	Include functional class 12	1790	55
13	**One-way Arterial**	**Belongs to the functional class 14 and 16.**	**1380**	**35**
14	Urban Principal Arterial	Functional class 14	1450	35
15	**One-way Collector**	**Belongs to the functional class 17**	**1000**	**30**
16	Urban Minor Arterial	Functional class 16	1200	30
17	Urban Collector	Functional class 17	1100	25
18				
19	Urban Local Road	Functional class 19	500	20

3.2.3 Speed

Average roadway speeds coded into the network were obtained from the SNHPC Congestion Quantity Study if it was included in the study or from the above table.

3.2.4 Model Capacities

Model capacities listed in the above table, calculated based on information in the Highway Capacity Manual 2000 were subjected to change during model calibration.

3.3 Terminal Times

Terminal times added to the beginning and end of a trip (TAZ to TAZ), were inherited from the 2005 model. TAZ terminal times were saved in Terminal.dbf file.

3.4 Turn Restrictions/Penalties

The model includes turn restrictions to reflect actual traffic operations at certain locations. Most delays at intersections derived from the 2005 model. Delays were estimated using Synchro for the intersections with turning movement counts were done since 2005. Delays at toll plazas were modified to reflect the addition of open road

tolling. Restrictions at interchange ramps and one way streets were added to the delay file.

3.5 External to External Trip Table

Percentages of external – external trips from the 2005 model were carried over to the 2010 model. Traffic volumes at these external stations were updated by using 2010 traffic estimates.

3.6 Friction Factors

Friction factors for the 2005 model were carried over to the 2010 model.

3.7 Trip Length Frequency Distribution Curves Comparisons

Following figures and tables compare the trip length frequency distribution developed from the household travel survey and the model results for each trip type.

Table 3.5 Trip Length Frequency Distribution

Travel time in minutes	Home Based Work (%)		Home Based Shop (%)		Home Based Social (%)		Home Based School (%)		Home Based Other (%)		Non-Home Based (%)	
	Survey	Model	Survey	Model	Survey	Model	Survey	Model	Survey	Model	Survey	Model
1 to 10	40.85	45.80	62.41	63.10	41.18	50.10	48.98	47.80	43.24	53.00	41.44	42.60
11 to 15	22.81	26.20	17.02	19.50	30.88	32.70	30.61	35.80	19.26	26.20	30.56	29.00
16 to 20	12.73	14.00	7.80	9.30	13.24	9.20	7.14	6.80	22.30	13.50	9.72	13.00
21 to 25	6.90	7.30	6.38	5.10	2.94	4.00	5.10	5.90	6.08	3.70	4.40	7.80
26 to 30	8.22	4.70	4.26	2.30	11.76	2.40	5.10	3.30	6.76	2.20	10.42	5.00
31 to 35	4.24	1.30	2.13	0.40	0.00	1.00	0.00	0.40	1.69	1.00	1.85	2.20
>36	4.24	0.70	0.00	0.30	0.00	0.70	3.06	0.00	0.68	0.60	1.62	0.40

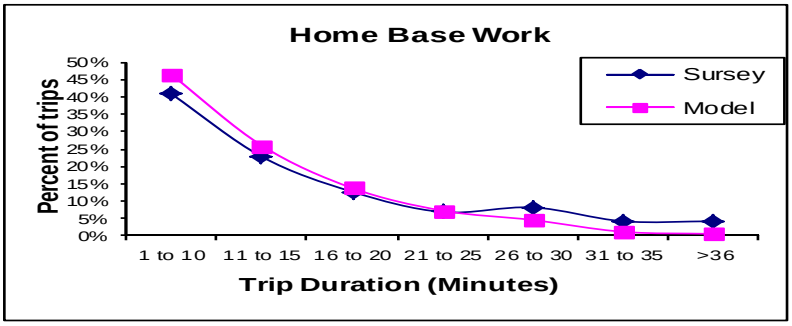
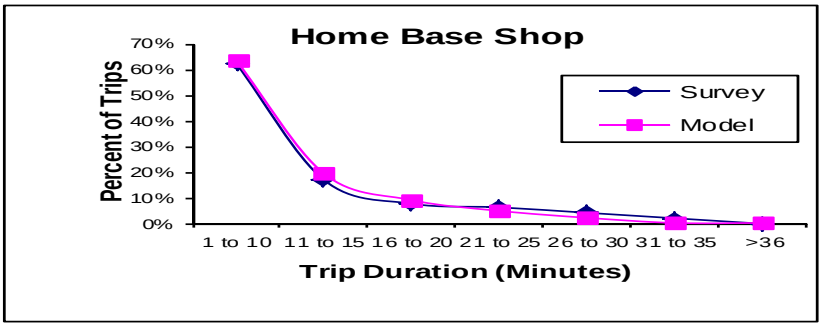


Figure 3.1 Home Based Work Trip Length Frequency



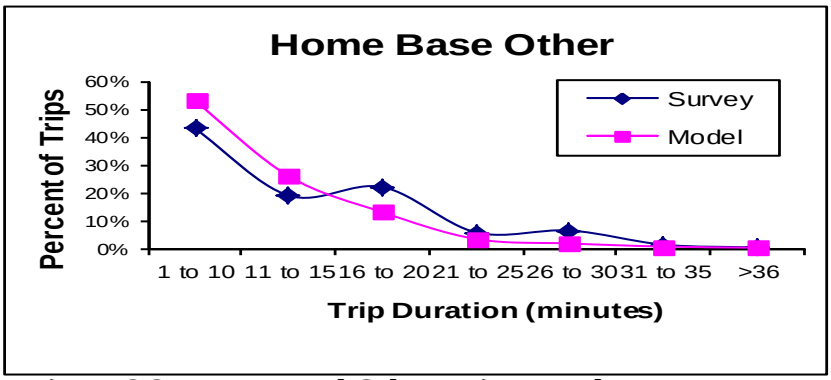


Figure 3.3 Home Based Other Trip Length Frequency

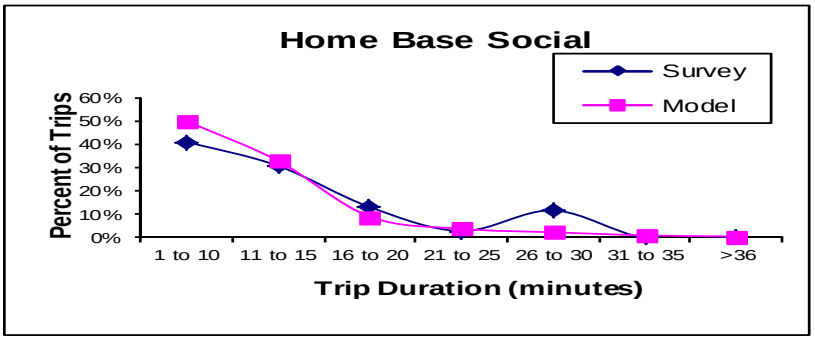


Figure 3.4 Home Based Social Trip Length Frequency

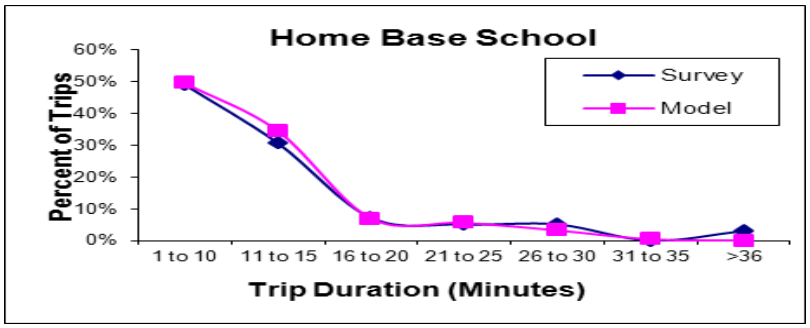


Figure 3.5 Home Based School Trip Length Frequency

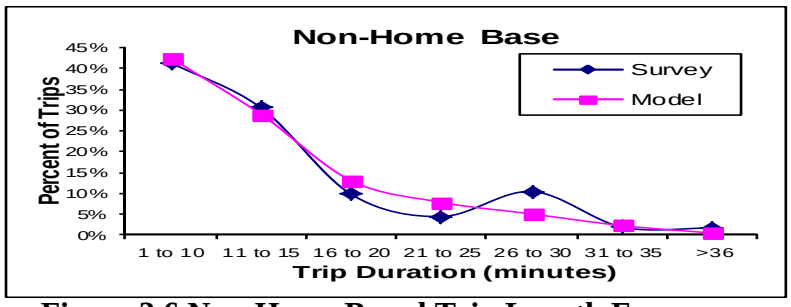


Figure 3.6 Non-Home Based Trip Length Frequency

3.8 Trip Distribution Conclusions

Based on the previous table and figures, similarities of trip length frequency between the 2007 household survey and the model are shown. The results of the trip distribution process were reasonable.

CHAPTER 4 TRUCK TRIP MODELLING

Trip generation step only captures household-based trips rather than commodity-based trips. To generate commodity-based trips, a truck trip table was developed based on Quick Response Freight Manual and NCHRP Synthesis 298, Truck Trip Generation Data.

4.1 Truck Trip Generation

Employment data used as inputs to the model were grouped as follows according to the NAICS codes:

- Agriculture, Mining and Construction (NAICS: 11, 21, 22, 23)
- Manufacturing, Transportation/Communications/Utilities (NAICS Code: 31, 32, 33, 42, 48, 49)
- Retail Trade (NAICS Code: 44, 45, 72)
- Offices and Services (NAICS Code: 51, 52, 53, 54, 55, 56, 61, 62, 71, 81, 92)

Besides the four employment categories, number of household was another variable for truck trip generation.

Because of a lack of local truck trip rate data for industrial categories, trip rates data shown below in table 4.1 from "Quick Response Freight Manual", was used. Truck trip rates were adjusted during calibration.

Table 4.1 Trip Generation Rate

Category	Agriculture, Mining and construction (11,21,22,23)	Manufacturing, transportation/ communications/ Utilities (31,32,33,42,48,49)	Retail Trade (44,45,72)	Offices and Services (51,52,53,54,55,56,61,62,71,81, 92)	Households
Trip Rate	0.865	0.706	0.663	0.283	0.213

The percentage of internal-external and external-internal in total truck trips in each TAZ was assumed to be similar to the 1990 truck trip table. The data was saved in the file IXper.DBF.

4.2 Truck Volumes at External Stations

Vehicle classification counts at external stations were used to estimate truck volume at these stations. For external stations where no data was available, default truck percentage was estimated from FHWA data, Census' Truck Inventory User Survey which can be found in the Quick Response Freight Manual or from adjacent roads with similar functional class. Truck volumes at external stations were stored in the file 10NBTRKEXT.dbf.

Six types of truck trip were generated. They are Productions, Productions of IX, Productions of XI, Attractions, Attractions of IX, and Attractions of XI.

4.3 Truck Trip Distribution

The TP+ software standard gravity model was used for truck trip distribution. A trip table representing the origins and destinations of individual truck trips was produced in the process. Fraction factors for use with the gravity model were based on travel time between analysis areas. Travel time was calculated using model network. The factors for all types of truck trips were calculated using a formula in Quick Response Freight Manual showing as follows.

$$F_{ij} = e^{-0.1*t_{ij}}$$

Where:

$\boldsymbol{F_{ij}}$ – Fraction factor.

$\mathbf{t_{ij}}$ – Travel time in minutes between analysis areas.

The factors were saved in the file 05NBTRKFRA.dat.

4.4 Input Files and Output File

In this process, following files fed into TP+ script to produce truck trip table.

10NBTRKSCO.DBF
10NBTRKEXT.DBF
IXper.DBF
10NBNETWORK.NET
10NBdelay.prn
10NBTRKFRA.DAT

Output File
10NBTRKOD.MAT

The truck trip table along with the passenger vehicle trip table and the external-external trip table were loaded onto the Viper Network in the trip assignment step.

CHAPTER 5 EXTERNAL TO EXTERNAL TABLE

5.1 Introduction

External stations in travel demand models are locations on the highway network through which trip travel in and out of the region. There are basically three types of movements through these external stations: internal to external (I-X), external to Internal (X-I), and External to External (X-X). The I-X trips have their origin inside the region and destination outside the region; the X-I trips have origin outside the region and destination inside the region; and X-X trips have both origin and destination outside the region. I-X and X-I trips are calculated in the trip generation process in the travel demand model. However, the X-X trips table, as a component of the regional travel demand model, has to be created externally (not using travel demand model) and to be integrated with the regular trips and truck trips for ultimate travel demand forecasting.

Basically, there are two methods to create a XX trip table: (1) Using equations such as those presented in Chapter 5 of the NCHRP report 365; (2) using an Origin-Destination (O-D) survey. An Origin-Destination survey was used to create XX trip table for the region.

5.2 O-D Survey

Generally, there are four O-D survey methods to collect information on the current trip: (1) License plate survey, (2) roadside hand survey, (3) roadside interview survey, and (4) combined roadside interview and handout survey. The roadside hand survey is the most cost efficient method and results in fewer traffic delays. As a result, a roadside hand survey was used to complete the O-D survey in 2007.

In the regional model, 67 external stations exist as 291 to 357. Total Annual Average Daily Traffic (AADT) traveling through these stations is 157,189 vehicles. To survey each station is time, labor, and finance consuming, so to survey all stations is unfeasible. As a result, 1990 XX trip table was examined to select survey locations. In case that percentage of XX trip in total traffic volume per station is unrealisticly high, the station

was selected as a potential location for the survey. Nine locations were selected for the O-D survey. For all stations exclusive of these nine, percentage of XX trip in total traffic volume per station was carried over from the order model. A summary of the survey responses for each of the location is shown in Table 5.1 below.

Table 5.1 O-D Survey Locations

LOCATION	LOCID	Card Needed	Card Received
F.E.E.E TPK AT Bedford Toll Plaza, NB	037100	3500	144
I-93 at Hooksett Toll Plaza, SB	225083	3500	349
BEALS RD AT MERRIMACK T/L Over Baboosic Brook	037091	300	28
STOWELL RD AT MERRIMACK T/L	037130	250	10
North Amherst RD at Amherst T/L	037074	380	38
Black Brook Road at Dunbarton T/L	175308	230	22
RESERVOIR DR AT DEERING T/L	471803	390	21
SUGAR HILL RD NORTH AT HOPKINTON T/L	471801	470	21
PINE ST AT BOW T/L	225369	700	49

Number of vehicles requested for the survey based on the 2005 traffic volume per location was calculated using statistical methods. These numbers are also shown in table 5.1. The sample sizes were determined through an assumed confidence level of 95 percent and confidence interval of 4 percent.

5.3 X-X Trip Table

To create the X-X trip table, following steps were taken:

1. The percentage of XX traffic volume in total traffic volume per station was computed using 2007 O-D survey data or 1990 XX trip table data.
2. The percentage of XX traffic volume of each O-D pair in total traffic volume of the origin station was calculated using 2007 O-D survey data or 1990 XX trip table data.
3. Unrealistic percentages were adjusted.
4. XX traffic volumes were distributed to each O-D pair according to the percentage of XX traffic volume from step 2 to get unbalanced XX trip table.
5. The unbalanced excel XX trip table was converted to a format that TP+ can be read by running the excel2TP visual basic script. The results will be saved in XXTPUNB2010 sheet.

6. Copy the sheet to OD2010.txt file.
7. Run TP+ Script to balance the XX trip table and the output XX trip table and vector.
8. Run Matrix Visual Basic script to convert the TP+ format data, the vector to an excel format trip table.

CHAPTER 6 TRIP ASSIGNMENT

In the process of trip assignment, trips in trip table, which are output of the trip distribution step, load onto the highway network to produce estimates of traffic volumes, congested speed, Vehicle Miles Traveled (VMT), and Vehicle Hours Traveled (VHT).

Prior to assigning vehicle trips to the roadway network, the conversion of people trips to vehicles trips is done at the trip generation phase for each trip type.

6.1 Auto Occupancy Rates

The following auto occupancy rates used to convert person trips to vehicle trips were established using the 2007 household travel survey data.

Table 6.1 Auto Occupancy Rates, 2007

Trip Type	Auto Occupancy (Person/vehicle)
Home Based Work	1.31
Home Based Shop	1.36
Home Based Social	1.65
Home Based School	2.37
Home Based Other	1.50
Non-Home Based	1.45

Once trips are converted to vehicle trips they are assigned to the network using a gap parameter of 0.0001 and volume-delay functions.

6.2 Volume – Delay Function

Trip assignment assigns vehicle trips to the roadway network using equilibrium assignment based on the assumptions that people will use the shortest time path and have "perfect" information about the routes available. Trips for each O-D pair are assigned to the links on the minimum path and trips are totaled for each link. The assigned trip volume is then compared to the link capacity to determine congestion. If a link is congested, the travel time is adjusted to result in a longer travel time. Changes in travel time means that the shortest path may change. This process is repeated several times (iterated) until there is an equilibrium between travel demand and travel supply. Trips on congested links will be shifted to uncongested links until this equilibrium condition occurs.

Traffic assignment step is influenced by the relationship between assigned volume and delay caused by congestion. Volume – delay function used to determine this relationship is shown below.

TC [1] = T0 * VDF (Linkclass, VC)

A set of factors were set based on the link class and V/C ratio.

```
; V/C  RI,  UI,  UPAO, RMiA, UMi_A,RMC,  UC,  U_Exp, R_Exp, RL,  UL,  Centroid
R="0.00, 1.000,1.000,1.000,1.000,1.000,1.000,1.000,1.000, 1.000, 1.000, 1.000,1.000",
 "0.10, 1.002,1.001,1.004,1.018,1.010,1.190,1.190,1.010, 1.020, 1.200, 1.200,1.030",
 "0.30, 1.005,1.001,1.006,1.050,1.022,1.395,1.395,1.040, 1.060, 1.400, 1.400,1.040",
 "0.50, 1.008,1.002,1.010,1.600,1.100,1.550,1.550,1.102, 1.869, 1.550, 1.550,1.060",
 "0.70, 1.009,1.003,1.030,2.330,2.100,1.595,1.595,1.270, 2.000, 1.600, 1.600,1.100",
 "0.80, 1.250,1.050,1.060,2.490,2.200,1.600,1.600,1.440, 2.850, 1.670, 1.670,1.140",
 "0.90, 1.295,1.085,1.340,2.550,2.600,1.650,1.650,1.610, 3.000, 1.700, 1.700,1.180",
 "1.00, 3.750,2.900,1.545,3.190,3.900,1.975,1.975,2.260, 3.890, 1.770, 1.770,1.260",
 "1.10, 4.950,4.300,2.720,3.600,3.950,2.625,2.625,2.900, 4.690, 1.820, 1.820,1.340",
 "1.17, 5.010,4.700,3.994,4.450,4.150,2.670,2.670,3.630, 5.000, 1.889, 1.889,1.453",
 "1.30, 5.000,5.000,4.120,5.487,5.600,2.690,2.690,4.390, 5.890, 1.915, 1.915,1.660",
 "1.50, 5.000,5.000,5.220,6.000,6.600,2.890,2.890,7.790, 7.790, 1.980, 1.980,2.300",
 "99.99,5.000,5.000,5.220,6.000,6.600,3.200,3.200,7.790, 7.790, 2.000, 2.000,2.300"
```

Chapter 7 Model Validation

Highway assignment is crucial for model to produce traffic volume estimates within acceptable ranges of tolerance compared to actual ground counts. Comparisons of VMT estimates between the model, the Highway Performance Monitoring System (HPMS) and SNHPC traffic count program are summarized in this chapter along with assignment statistics. EPA mandates a 3 percent difference of VMT estimates between the model and HPMS as an acceptable tolerance level for regional air quality planning and conformity purposes. A comparison of traffic volumes between model estimates and ground count screen line and cordon line are presented in this chapter as well as validation results of traffic volumes on individual links.

7.1 Vehicle Miles Travelled

Because HPMS VMT estimates of 2010 are unavailable in New Hampshire, model VMT estimates were compared with 2010 VMT of the SNHPC Traffic Count Program. If traffic volume for a link was not available in traffic count program, estimates for the traffic volume on adjacent links were used. Region wide VMT calibration results are shown in the following table by functional class. The results show that region-wide VMT calibration meets the FHWA target percentage for VMT difference between the model and ground counts.

Table 7.1 Model VMT Estimates Verse VMT of Traffic Count Program

Functional Class	2010 VMT Estimates of Traffic Count Program	2010 Model VMT	% Difference
1	389,965	405,956	3.94%
2	401,994	428,680	6.23%
6	80,375	96,125	16.39%
7	381,212	432,241	11.81%
8	85,489	99,278	13.89%
9	258,656	286,314	9.66%
11	1,864,079	1,809,259	-3.03%
12	399,050	415,206	3.89%

14	860,674	791,242	-8.78%
16	1,177,920	1,201,258	1.94%
17	493,457	511,284	3.49%
19	267,790	257,720	-3.91%
Total	**6,660,660**	**6,734,561**	**1.10%**

In New Hampshire, 2008 HPMS VMT estimate was available for model calibration. To produce 2008 model VMT estimates, 2008 social economic data was applied to the 2010 model network. A comparison of VMT between 2008 HPMS and 2008 model generated is made in the following table. The table shows that the model VMT estimates satisfy the EPA requirement.

Table 7.2 2008 Model Estimate Versus 2008 HPMS VMT Estimates

2008 HPMS VMT	2008 Model VMT	% Difference	Target for % Difference (EPA)
6,606,565	6,773,936	2.53	3

7.2 Traffic Volume

7.2.1 Region wide

After validation of the VMT, the next level of validation of the highway assignment involves comparison of observed versus estimated traffic volume on the highway network. Two measures, the Coefficient of Determination (R^2) and Percent Root Mean Square of the Error (%RMSE), to examine performance of the model were calculated using following equations:

$$R^2 = [Correl(Model, Count)]^2$$

Where: Correl=Correlation Coefficient

$$Correl(Model, Count). = \frac{\sum_j (Model - Ave.Model)(Count - Ave.count)}{\sqrt{\sum_j (Model - Ave.Model)^2 (Count - Ave.count)^2}}$$

$$\%RMSE = \frac{(\sum_j (Model_j - Count_j)^2 / (Numberofcounts - 1)^{0.5} * 100}{\sum_j Count_j / NumberofCounts)}$$

R^2 region wide equals 0.90 which is greater than FHWA requirement which is 0.88. %RMSE equals 27.55 for all roadways with functional class collector and higher which is less than the commonly accepted FHWA standard 30.

7.2.2 Screen Line and Cordon line

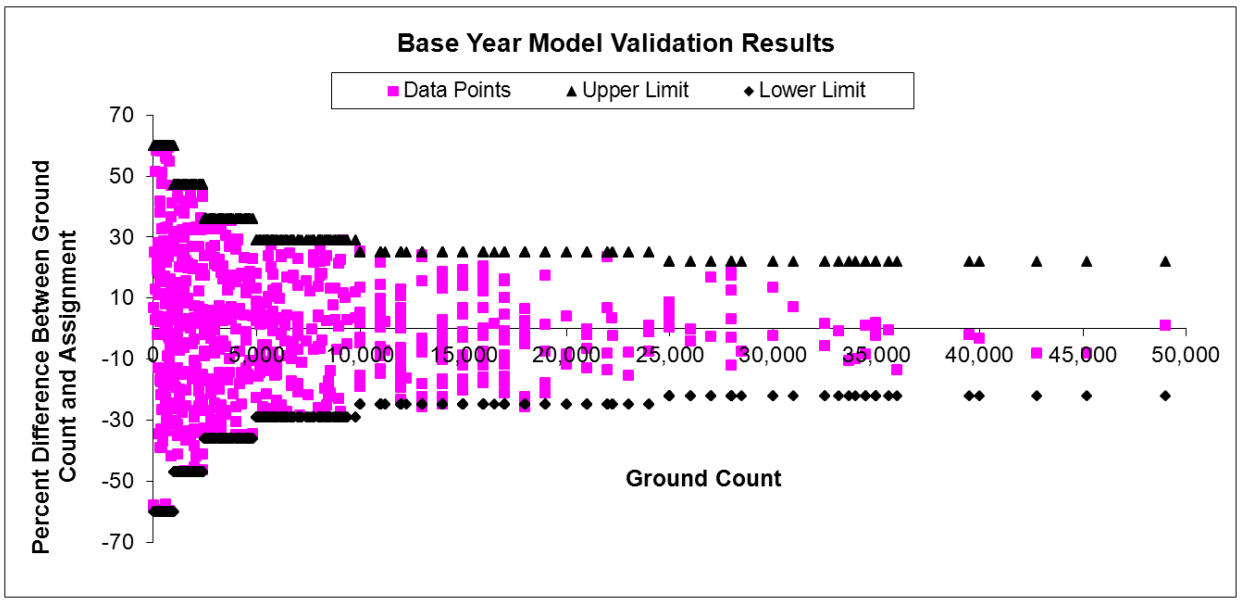
Total observed versus model estimated volumes at a Merrimack River screen line crossing and external stations cordon line crossings were compared in the following table. The table shows both absolute percentage differences are less than 2 percent.

Table 7.3 Total Observed Versus Model Estimates Traffic Volumes

Criteria	2010 Ground Count	2010 Model	% Difference
Daily traffic volume at all external stations	493,818	481,120	2.64%
Merrimack River screen line crossing	247,016	246,000	0.41%

7.2.3 Individual Links

A comparison of the actual ground count to assignment on a link by link basis is one of the more severe tests for a regional model. As can be seen from Figure 7.1, the ground count and model assignment pairs compared fell within the FHWA validation criteria.



From:	Julie Chen
To:	Snyder, Kerri; Adam Hlasny; John Munn
Cc:	Chris Bean; Tidd, Leo; "Craig R Seymour" (crs@rkgassociates.com); I93-Exit4A-EIS (SM); David Preece
Subject:	RE: I-93 Exit 4A: SNHPC Interview Summary
Date:	Thursday, August 04, 2016 10:03:21 AM
Attachments:	Londonderry_2012.doc Final Draft Economic Development Chapter December 26 2014_Copy.docx Final DRAFT Land Use Chapter December 26 2014.docx NHES Economic Impact Final Report of Mixed Use Projects in Region.pdf

Hi Kerri:

My answers to the questions in blue. If you have any questions, please let me know.

Julie Chen

From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Wednesday, August 03, 2016 11:14 AM
To: Julie Chen; Adam Hlasny; John Munn
Cc: Chris Bean; Tidd, Leo; 'Craig R Seymour' (crs@rkgassociates.com); I93-Exit4A-EIS (SM)
Subject: I-93 Exit 4A: SNHPC Interview Summary

Julie, Jack, and Adam,
Thank you for taking the time to meet with us on July 25. Attached is a draft summary of our discussion for your review and comment. In addition, we respectfully request the following information.

1. Confirmation of 2050 as the outlook year for the population projections. This is what is stated in the letter to the Town of Derry. Also, is 2012 the date the most recent projections were created (when letter is dated)? Were the projections updated in 2014? If so, is the outlook year still 2050?

Yes. We have projections up to 2050. The projections haven't updated since 2012.

2. Copies of the letters (similar to the copy you provided for the Town of Derry) sent to the towns in the SNHPC area requesting input on the population projections.

   Attached.

3. Results of a search SNHPC files to determine if Derry or Londonderry submitted comments in response to the letters from SNHPC in 2012 explaining the updated population and dwelling unit projections.

Don't have any records showing comments on population and dwelling projection from the two towns. But we did contact Londonderry for employment projection regarding Pettengill Road and Woodmont Common. We adjusted TAZ level employment allocations for Pettengill Road development. At that time, it is too early to tell how many jobs will be created by Woodmont Common.

March 14, 2012

Mr. Andre Garron, AICP, Director
Londonderry Community Development Department
268B Mammoth Road
Londonderry, NH 03053

Re: Population and Dwelling Unit Projections

Dear Mr. Garron:

The Southern New Hampshire Planning Commission (SNHPC) has completed the new population and dwelling unit projections for the region's towns and traffic zones. The projections look at the years 2010 - 2050. At this point, we would like to share our results with you for your review and comments.

The 2010 U.S. Census counted population for Londonderry was 24,129. According to the SNHPC figures, the number of dwelling units in Londonderry was 8,771. The SNHPC projected population for 2050 is 37,623, an absolute change of 13,494 persons, and the projected number of dwelling units is 13,044, an absolute change of 4,273 units. These projections represent annual compound growth rates of 1.12 percent and 1.00 percent respectively. Please see the attached tables for details on a five-year basis.

The population projection was conducted using the Cohort Component Method. The actual births and deaths used were obtained from the NH Department of Health and Human Services, Bureau of Vital Records. The regional survival rates were calculated using life table derived from Office of Energy and Planning (OEP). The one variable generated by the SNHPC was the projected net migration. Using the past 40 years of net migration, we projected four possible future net migration outcomes: high, middle, low, and historical average. The most probable of the four was selected to generate the final projection; for Londonderry we used our low net migration projection.

Dwelling Units were projected based on the annual average of the past 40 years of Building Permits issued (1970 - 2009). The OEP figures from their "Current Estimates and Trends in New Hampshire's Housing Supply, Updates 1989, 1999 and 2009" were used along with "1970-1979 Estimates of Housing Supply for Towns and Counties in New Hampshire." The building permit data was analyzed and any years with atypical net dwelling unit increases were excluded from the calculation of the annual average. For Londonderry, the annual average of net dwelling unit increase used in the projection was 116.

Using the totals from the population and dwelling unit projections, the net increase expected for each projected five year increment was distributed to the various traffic zones. Please refer to the attached traffic zone map for the location of zone boundaries. General assumptions made in this process were that growth rates would remain constant in each traffic zone and zoning ordinances would not change significantly over the projected time span. More specific assumptions were made in determining the amount of growth each traffic zone would receive based on the existing zoning of vacant land, the quantity of vacant land, the location of wetlands, steep slopes, water bodies or other natural development constraints, the existing land use coverage, the planned development area from SNHPC Comprehensive Plan; and the known proposed developments.

In Londonderry, the following assumptions were made to distribute the dwelling unit increases to the individual traffic zones:

- Traffic zones 101, 100, and 102 would receive the greatest share of dwelling units given the quantity of buildable residential land, and residential construction trends of 1990-2010.
- Traffic zones 64L, 284, and 65 would receive the least amount of dwelling units due to less buildable residential land than elsewhere, and the industrial nature of zones 64 and 65.

Distribution of population increases to the individual traffic zones were in proportion to dwelling unit increase in the individual traffic zones.

Please review the information in this letter along with the attached supporting tables. We greatly welcome your comments so that our projections will best reflect Londonderry's future growth. If you have comments or suggested revisions, please contact Julie Chen, Ph.D. within the next two weeks at (603) 669-4664 or jchen@snhpc.org. We would be happy to schedule an appointment to sit down with you and review the data in more detail. If we do not hear from you in the next three weeks, we will assume you are comfortable with our projections.

Sincerely,

SOUTHERN NEW HAMPSHIRE
PLANNING COMMISSION

David J. Preece, AICP
Executive Director/CEO

cc: SNHPC Representatives:
Sharon Carson, Arthur Rugg, Donald Moskowitz, Deborah Lievens, Leitha Reilly, Martin Srugis

4. Confirmation of the source of the employer database used in the 2010 population projections
   NHDOT got employment database form NH Employment Security.

5. The 2015 plan makes reference to a critical document to request from SNHPC in transmittal: "Economic Impact of Mixed Use/Commercial Developments in Rockingham County, March 2014. Would you provide a copy of this document?

You can find how we used the Results of the Economic Impact Final Report in the attached Land Use Chapter of Moving Southern NH Forward Regional Comprehensive Plan 2015-2035 pages 48-55. Also see future employment growth pages 26-28 in attached Economic Development Chapter. The BEA 2014 Report using the REMI model is also attached.

6. We have reviewed the technical report that outlines the methodology for and calibration of the model. Have there been any major updates to the model since this documentation was prepared?

Since then we added Windham and Francestown to the regional model. Right now we have three models: Original model including thirteen communities, Original model + Windham (2013), Original model + Windham + Francestown (2014). The three models used same methodology, social economic data and projections.

7. During the meeting, you mentioned that the next SNHPC planning effort was the housing needs assessment. Is there a timeline for estimated completion of this assessment?

The last full housing needs assessment was in 2010 with an update in 2015. Please refer to Housing Chapter in Moving Southern NH Forward Regional Plan 2015-2035

We look forward to your comments on the draft interview summary as well as the aforementioned information requests.

Regards,
Kerri

Kerri Snyder, AICP
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I-93 Exit 4A Supplemental Environmental Impact Statement

Land Use Planner Interview Summary- Draft 8/2/2016

NH Office of Energy and Planning

Following is a summary of the interview held on July 26, 2016 at the OEP office in Concord. Attendees were as follows:

- OEP – Ken Gallager
- Louis Berger – Leo Tidd and Kerri Snyder
- RKG Associates – Craig Seymour

Population

OEP's last release of official state population projections for the state, counties, and municipalities was in 2013 (Attachment A). OEP is currently working on 2016 population projections, which are anticipated to be complete in September 2016. The factors behind the need the update the 2013 projections include OEP's 2015 population estimates and the change in migration of populations within the State. The vital statistics/trends have not changed, but migration to southern New Hampshire is greater than anticipated at the time the 2013 projections were prepared and migration to the northern and western portions of the State is less than anticipated.

The methods used to generate the population projections are outlined in the 2013 report[1], and the 2016 projections are based on the same methods (i.e., cohort projections, IRS data, and migration rates). Differences in net-migration rates are shown in Attachment A. The OEP conducted a meeting with the regional planning commissions to reach consensus on the migration rates to be used in the population projections. The group reached consensus on using 2000-2005 migration rates, reflecting a moderate growth outlook more positive than the late 2000's, but not as robust as the 1990's.

In allocating county-level population projections to towns, OEP based on share of population in each town and how that share has changed between 2000 and 2010. In other words, the projections assume that the current trend in each town will continue, fast growing towns will continue to grow faster than the county average and slower growing towns will experience less growth.

The group discussed the trend of declining populations in Derry due to the aging of the population. Derry experienced a population loss of 1,000 between the 2000 and 2010 Census; however, the population losses in the younger cohorts were greater. Population estimates consider the number of dwelling permits issued, though it was noted that number of dwellings can lead to an overestimate that is adjusted in comparison to Census estimates.

[1] https://www.nh.gov/oep/data-center/documents/2013-projections-municipalities.pdf

The Exit 4A project and related potential for land development was not considered by OEP explicitly or implicitly in making the latest population projections. The group discussed that the situation with Exit 4A is different than the situation with the I-93 Salem to Manchester project where coordination with OEP led NHDOT and FHWA to conclude that the OEP projections represented a "Build" scenario for purposes of the I-93 SEIS. I-93 is of major economic importance to the state, and links New Hampshire to economic activity in Massachusetts and Boston metro area. As a result, the I-93 SEIS concluded growth would be lower along the I-93 corridor without the widening because the level of traffic congestion would rise to level that would adversely impact economic development. Projects such as Exit 4A that not have a large regional effect are not considered in OEP's projection process, as a result OEP agreed that their projections best represent a "No Build" scenario for purposes of the Exit 4A project. In other words, the OEP projections do not already include growth that would potentially be caused by Exit 4A (such as additional build-out of Woodmont Commons). Large scale planned developments, such as Woodmont Commons, are not included in the population projections; however, these developments would be represented in the population estimates after the development is completed.

RLS Demographics

State of New Hampshire, Regional Planning Commissions
County Population Projections, 2016
Preliminary Version 2 – Migration Scenarios

At the Regional Planning Commission meeting of April 18, it was decided to use the latest Census and OEP population estimates and reported vital statistics data to establish the 2010 to 2015 population change benchmark. The projection scenarios presented here use fertility, mortality and migration rates calibrated to the known input targets and then explore future migration rate changes to the year 2040.

The data inputs for the projections model include: the 2010 Census population by age and sex, special population distributions by age and sex (college, prison and nursing home populations), fertility patterns by age of mother, survival distributions by age and sex, and migration patterns by age and sex. The model is calibrated to these inputs for the 2010 to 2015 experience as defined by the actual reported data and estimates results. The projection scenarios to 2040 are based on the 2015 targets and future assumptions of possible migration patterns based on historical migration rates. The scenarios presented here illustrate the impact of migration rate changes alone. Fertility and mortality assumptions are held constant in each of the scenarios presented.

Historical Net Migration

Age patterns of migration can remain remarkably stable through fluctuating economic cycles. But the Crude Migration Rate (the total net migrants divided by the beginning period population) is directly impacted by the economy and, in particular, long-term cycles of employment and housing market shifts. The most recent economic recession provides a good example of this impact with some areas showing recovery much more quickly than others.

In establishing future scenarios of net-migration for New Hampshire counties, it is useful to look at historical migration rates as a baseline for future assumptions. Table 1 presents 5-year migration rates by county for each 5-year period from 1990 to 2015. These rates are derived by breaking down the total population change for the period into the components of births, deaths and the residual net-migration. The total county population is obtained from the decennial census results for 1990, 2000 and 2010, adjusted to a July 1 reference date. The Census Bureau's intercensal estimates provide the mid-decade population for 1995 and 2005 and the most current OEP and Census estimates are used for 2015. The birth and death data are based on the New Hampshire Vital Records Information Network web query system and New Hampshire Department of Health and Human Services vital statistics reports.

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2016 Projections (Draft)

RLS Demographics

Table 1: Net-Migration Rates

	1990 to 1995	1995 to 2000	2000 to 2005	2005 to 2010	2010 to 2015
New Hampshire	0.9%	5.3%	3.2%	0.2%	0.8%
Belknap	3.8%	7.9%	6.3%	-0.6%	1.8%
Carroll	8.4%	12.3%	6.1%	2.8%	0.7%
Cheshire	0.0%	2.5%	3.4%	-0.9%	-0.8%
Coos	-3.3%	-1.2%	3.1%	-1.9%	-3.0%
Grafton	3.5%	3.6%	5.5%	3.4%	0.4%
Hillsborough	0.8%	5.5%	1.4%	-0.9%	0.1%
Merrimack	2.0%	6.8%	5.4%	0.1%	0.9%
Rockingham	0.0%	6.3%	2.9%	0.2%	2.4%
Strafford	-1.3%	3.6%	3.0%	2.0%	2.0%
Sullivan	-0.6%	1.6%	3.3%	-0.1%	-1.1%

Rockingham Co. returns to circled rate by 2030

Table 2 presents five different migration scenarios based on the historical experience. The assumptions underlying each scenario run are described below the table. Run 1 very closely approximates the results from the 2013 round of RPC projections with some slight adjustments of fertility and mortality rates to meet the target 2010 to 2015 experience.

Table 2: Preliminary Projections Version 2 Comparison

	2010 Census Estimates Base	2015 Target Population	2040 Projection Scenario 1	2040 Projection Scenario 2	2040 Projection Scenario 3	2040 Projection Scenario 4	2040 Projection Scenario 5
Belknap County	60,088	60,441	64,373	68,687	66,817	69,615	57,118
Carroll County	47,818	47,650	52,446	49,056	47,628	55,493	40,448
Cheshire County	77,117	76,592	76,663	82,717	81,068	81,026	70,203
Coos County	33,055	31,554	27,238	28,566	27,686	27,763	23,414
Grafton County	89,118	89,377	95,877	102,079	99,950	99,999	83,303
Hillsborough County	400,721	404,765	426,157	434,055	428,433	473,686	402,024
Merrimack County	146,445	148,123	156,835	171,554	166,762	172,649	145,824
Rockingham County	295,223	301,095	320,618	325,768	322,111	350,358	307,533
Strafford County	123,143	126,440	137,182	146,848	145,636	147,770	139,630
Sullivan County	43,742	43,152	46,449	43,878	42,601	42,605	36,865
New Hampshire Total	1,316,470	1,329,189	1,403,838	1,453,208	1,428,692	1,520,964	1,306,362

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2016 Projections

RLS Demographics

Assumptions:

Scenario 1:

Target Total Fertility Rate 2010-2015 and held constant for the projections period,
Target Crude Migration Rate 2010-2015 with original 2013 rates for the projections period,
Target Survival Rate distribution 2010-2015 and adjusted for improved survival for the projections period.

Scenario 2:

Target Total Fertility Rate 2010-2015 and held constant for the projections period,
Target Crude Migration Rate 2010-2015, future assumption of return to 2000 to 2005 migration rates by 2030 and held constant to 2040,
Target Survival Rate distribution 2010-2015 and adjusted for improved survival for the projections period.

Scenario 3:

Target Total Fertility Rate 2010-2015 and held constant for the projections period,
Target Crude Migration Rate 2010-2015, future assumption of return to 2000 to 2005 migration rates by 2040,
Target Survival Rate distribution 2010-2015 and adjusted for improved survival for the projections period.

Scenario 4:

Target Total Fertility Rate 2010-2015 and held constant for the projections period,
Target Crude Migration Rate 2010-2015, future assumption of return to historically highest migration rates by 2040,
Target Survival Rate distribution 2010-2015 and adjusted for improved survival for the projections period.

Scenario 5:

Total Fertility Rate 2010-2015 and held constant for the projections period,
Target Crude Migration Rate 2010-2015 held constant throughout 2040,
Target Survival Rate distribution 2010-2015 and adjusted for improved survival for the projections period.

Total non-farm and private sector employment in New Hampshire continue a nearly steady increase from the recessionary low in early 2010. Preliminary March 2015 to March 2016 total non-farm employment increased by 10,500 jobs and represents an increase of nearly 40,000 from March of 2010. Given the increased employment activity and the meeting discussion regarding housing supply and demand, it seems reasonable to assume a more optimistic migration scenario than what was assumed in the 2013 round of projections.

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I-93 Exit 4A Supplemental Environmental Impact Statement

Land Use Planner Interview Summary- Final 8/7/2016

Woodmont Commons

Following is a summary of the interview held on July 25, 2016 at the Gallagher, Callahan, and Gartrell, P.C. office in Concord. Attendees were as follows:

- Woodmont Commons Representative (Developer) – Ari Pollack of Gallagher, Callahan, and Gartrell, P.C.
- CLD Consulting Engineers – Chris Bean
- Louis Berger – Leo Tidd and Kerri Snyder
- RKG Associates – Craig Seymour

Development and Land Use

The discussion centered on the planned development of Woodmont Commons and the Exit 4A project. The Planned Unit Development (PUD) Master Plan for Woodmont Commons approved by the Town of Londonderry in 2013 provides the overall framework for the development of the site, with additional details addressed through site plan review of specific development proposals. Currently, Phase I is currently under a design review by the Town. The Development Agreement with the Town for the entire Woodmont Commons project includes provisions for mitigation of traffic impacts for each phase (discussed below). The Developer's current expectation is a 20-year build out for the entire development (east and west of I-93).

The PUD Master Plan includes caps on the maximum development permitted in specific areas of Woodmont Commons with and without Exit 4A. These caps were developed based on a negotiation between what the Developer and the Town. As part of these negotiations, detailed technical memoranda were produced by consultants to the Developer and the Town that helped shape the final development quantities presented in the PUD. The Exit 4A project team will request this documentation from the Town of Londonderry.

The group discussed what level of development would be likely to occur on the east side of I-93 without Exit 4A. Without Exit 4A, the development on the east side of I-93 would likely go back to a residential development model (up to 330 units as allowed by the PUD). The group agreed that the 400,000 gsf of office development potentially allowed in WC-12 without Exit 4A according to the PUD would not be likely actually occur given the amount of traffic mitigation that would be required. Instead, a more realistic No Build development scenario would be a small number of supporting commercial businesses serving the needs of the 330 residential units (such as a convenience store or pharmacy).

The current programming for the east side, which is also preferred by the Town of Londonderry, is for commercial land use accessed via Exit 4A. In the with- Exit 4A scenario, the Developer expects a mixed use build-out on the east side of I-93 to the level indicated by the caps in 2013 PUD Master Plan by 2040. In other words, the PUD caps represent a reasonable "Build" scenario for the Exit 4A project. In terms of the timing of the east-side development in the Build

scenario, no development would be expected to start until after the completion of Exit 4A (currently expected by 2022). Nothing has been pre-sold or pre-leased. If Exit 4A does not move forward, the land would be used for residential development as noted above.

Regardless of the type of development on the east side, the Developer is sensitive to the environmental features (e.g., wetlands and vernal pools) and intends to minimize potential impacts to these features.

For the west side of I-93, the Developer believes the same basic build-out by 2040 will occur with and without Exit 4A; however, as previously noted, the PUD includes slightly lower development caps on the west side without Exit 4A.

Alternative A is the preferred alignment for Woodmont Commons. Alternatives C and D would require creation of a road system to support the easterly development, and the traffic mitigation required would limit commercial development to ancillary development in support of an overall residential land use. With Exit 4A, Alternative A, subarea WC-12 (east of I-93) is desirable for a commercial/institutional campus, which would result in the creation of new jobs for the state rather than shifting jobs from elsewhere within New Hampshire. Woodmont Commons is currently considering opportunities for commercial markets that are not currently present in southern New Hampshire.

Transportation

The Development Agreement with the Town of Londonderry contains provisions for transportation improvements to support Phase I and II of the Woodmont Commons development. The approval process for these phases and future phases includes provisions for traffic studies and requires mitigation based on those studies to support the traffic generated from the development. NHDOT weighs in on improvements of state facilities (e.g., Route 102); however, the primary coordination of transportation mitigation is with the Town. Although NHDOT does not have a site approval mechanism, per se, it does approve driveway access from state facilities.

From:	Ari Pollack
To:	Snyder, Kerri
Cc:	Chris Bean; Tidd, Leo; I93-Exit4A-EIS (SM)
Subject:	RE: Market Basket Redevelopment - Summary
Date:	Friday, September 16, 2016 11:03:49 AM

Perfect.

Ari B. Pollack, Esq.
603.228.1181
800.528.1181

http://www.gcglaw.com

Gallagher, Callahan & Gartrell, P.C.
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214 N. Main Street
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From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Friday, September 16, 2016 11:42 AM
To: Ari Pollack <pollack@gcglaw.com>
Cc: Chris Bean <ChrisB@cldengineers.com>; Tidd, Leo <ltidd@louisberger.com>; I93-Exit4A-EIS (SM) <I93-Exit4A-EIS@louisberger.com>
Subject: Market Basket Redevelopment - Summary

Ari,
Thank you for your time today in talking about the Market Basket Redevelopment Area. Following is a summary of our conversation.

The Market Basket Redevelopment area, owned by DeMoulas Super Markets Inc., is part of the Woodmont Commons Subarea WC-1GL. The new Market Basket was built on the other side of the plaza (in WC-1GL) in 2011. The redevelopment of the original Market Basket and associated retail area included the demolition of approximately 74,000 GSF of commercial space and the construction of approximately 42,000 GSF of commercial space. The construction is complete, and as of May

2016, the area was occupied completely by a state liquor store, card shop, TJMaxx, and Marshalls Home Goods.

In addition, there are four pads available for development within WC-1GL, also owned by DeMoulas. These pads are located along the roadway running through the Woodmont Commons development area connecting Garden Lane and Pillsbury Road.

DeMoulas is currently looking for potential tenants and has received interest from multiple parties. The development of these parcels would occur with or without the Exit 4A project. At this time, it is not possible to determine the GSF associated with these four pads, as the types of tenants and buildings that would be constructed are unknown.

I appreciate your review of the summary. Your comments are appreciated.

Regards,
Kerri

Kerri Snyder, AICP
Principal Environmental Planner | Transportation Planning and Environment
Louis Berger
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Snyder, Kerri

From: Snyder, Kerri
Sent: Thursday, August 11, 2016 1:21 PM
To: 'Bill Herman'
Cc: I93-Exit4A-EIS (SM); Tidd, Leo; Chris Bean
Subject: RE: I-93 Exit 4A: Town of Auburn Land Use and Development Discussion with Bill Herman

Bill,
Thank you for your review. I appreciate your time in talking with me.
Regards,
Kerri

From: Bill Herman [mailto:townadmin@townofauburnnh.com]
Sent: Thursday, August 11, 2016 9:37 AM
To: Snyder, Kerri <KSnyder@louisberger.com>
Cc: I93-Exit4A-EIS (SM) <I93-Exit4A-EIS@louisberger.com>; Tidd, Leo <ltidd@louisberger.com>; Chris Bean <ChrisB@cldengineers.com>
Subject: RE: I-93 Exit 4A: Town of Auburn Land Use and Development Discussion with Bill Herman

Thank you very much for sharing the summery below Kerri.

That is a very good and accurate reflection of our conversation, and I don't find anything to correct or have anything additional I can add.

I appreciate the ability to review the summary.

Bill

Bill Herman, CPM
Town Administrator
Town of Auburn
PO Box 309
Auburn, NH 03032
(603) 483-5052, ext. 111

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From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Tuesday, August 09, 2016 5:46 PM

To: Bill Herman <townadmin@townofauburnnh.com>
Cc: I93-Exit4A-EIS (SM) <I93-Exit4A-EIS@louisberger.com>; Tidd, Leo <ltidd@louisberger.com>; Chris Bean <ChrisB@cldengineers.com>
Subject: I-93 Exit 4A: Town of Auburn Land Use and Development Discussion with Bill Herman

Bill,
Thank you for your time today. Following is a summary of our discussion regarding I-93 Exit 4A and the Town of Auburn.

In the 2015 Regional Comprehensive Plan, Moving Southern New Hampshire Forward: 2015-2035, the SNHPC projects that Auburn will have a 2020 population of 5,288 and a 2040 population of 6,226. You stated that the current population of Auburn was approximately 5,200, so the 2020 projection may be slightly low.

In discussing the primary drivers for growth in Auburn, you stated that Auburn is largely a bedroom community with limited businesses. The Town is approximately 16,000 acres, with about a quarter of that area (approximately 4,200 acres) being the watershed for Massabesic Lake, which is the water supply for the City of Manchester. This limits the area available for development.

A primary driver of growth over the last five years has been the change in high school from Manchester to Pinkerton Academy. Auburn has a good local elementary school, and the change in high school has been viewed favorably and a selling point for homes in Auburn. The other primary driver of growth is location. Auburn is located near Exits 1 and 2 of Highway 101, and access between the town and I-93 is convenient. The majority of Auburn's population works elsewhere (Manchester and points north and south of Manchester).

Auburn has a growth management policy that has been in place for about 25 years. The growth management policy is based on the number of building permits allowed per year, and it is adjustable each year. Although the threshold to trigger the growth management policy has not been triggered, Auburn's development has been different than most of the surrounding communities. Auburn has issued about 35 new home building permits per year, and that did not change with the economic turndown in 2007-2008. The new home building permits are not for spec housing; rather they are for custom homes. The average housing price in Auburn is between $350,000-$600,000. You mentioned that the steady increase in housing construction has not resulted in a commensurate increase in elementary school enrollment. It appears that many of the homes are built for older couples, with no children living in the home, or for families with older children, for which the Pinkerton Academy is the selling point.

Based on our discussion, the proposed Exit 4A project is not anticipated to affect development and population growth in Auburn. There may be a beneficial effect on travel time if some of the traffic on I-93 is pulled off of the interstate by Exit 4A, but it is likely that this effect would be minor. Auburn residents would not be likely to use Exit 4A to travel from I-93 to Auburn due to the convenience of access provided by Highway 101.

Any comments on the summary of our discussion are appreciated.

Regards,
Kerri

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Snyder, Kerri

From: Snyder, Kerri
Sent: Friday, August 12, 2016 4:36 PM
To: 'Andrew Hadik'
Cc: Chris Bean; Leo Tidd (ltidd@louisberger.com); I93-Exit4A-EIS (SM) (I93-Exit4A-EIS@louisberger.com)
Subject: RE: I-93 Exit 4A: Town of Chester Land Use and Development Discussion with Andrew Hadik

Andrew,
Thank you for reviewing the summary. Following is the updated summary with your changes in red accepted.
Regards,
Kerri

In the 2015 Regional Comprehensive Plan, Moving Southern New Hampshire Forward: 2015-2035, the SNHPC projects that Chester will have a 2020 population of 5,404 and a 2040 population of 6,437. You mentioned of not having enough knowledge to dispute those projections, however, believe those numbers to be relatively conservative and stated that Chester is currently experiencing significant growth pressure in the form of single-family residential development. Many of the subdivisions that have been dormant since the 2007-2008 economic downturn have recently restarted development. This resurgence began in Spring 2016. The primary drivers for additional residential development in Chester are good schools and the desire for rural living.

We discussed schools and population growth. Due to the very recent resurgence of residential/subdivision development, it will likely be a year or two before Chester experiences a significant increase in elementary school enrollment. At this point, it is too early in the boom cycle to say whether or not there would be a commensurate increase in school-age population/shift in demographics of the population. You would, however, expect to see an increase because most new home buyers in Chester have one or more children.

From a transportation perspective, you stated that growth in the surrounding towns (Auburn, Sandown, and Raymond) has resulted in a noticeable traffic impact to Chester roadways, specifically the intersection of NH State Routes 121 and 102. At peak rush hour (am and pm), you see significant traffic congestion on SR 121 in both directions.

We discussed the proposed Exit 4A project and whether it would have an effect on growth in Chester. Based on your experience, you believe that Exit 4A will induce additional residential growth in Chester due to improved access to I-93. However, it seems unlikely that Exit 4A would result in a measurable long-term decrease in travel time for Chester residents due to the induced development associated with the project.

Although Exit 4A would enable additional growth in Chester, the Town has a growth management provision in its zoning ordinance that would go into effect if pressure on school, fire, and police services would outstrip the Town's ability to keep pace with development. There is also an open space subdivision provision to encourage subdivisions to be creatively designed in a way that reduces sprawl and protects natural resources and rural character. The most typical type of residential development seen in Chester is still open space subdivisions, however, recently, 3 small subdivisions have applied for approval with estate size lots that allow enough space to support horses.

From: Andrew Hadik [mailto:chstrpl@gsinet.net]
Sent: Friday, August 12, 2016 3:51 PM
To: Snyder, Kerri <KSnyder@louisberger.com>
Subject: RE: I-93 Exit 4A: Town of Chester Land Use and Development Discussion with Andrew Hadik

Hi Kerri,

Below is my review of your summary with comments in red.

It was nice speaking with you on Wednesday.

Regards,

Andrew

Andrew L. Hadik

Planning Coordinator
Chester Planning Board

Office: 603.887.5629

Town of Chester, 84 Chester Street, Chester, NH 03036

From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Tuesday, August 09, 2016 3:46 PM
To: chstrpl@gsinet.net
Cc: I93-Exit4A-EIS (SM) <I93-Exit4A-EIS@louisberger.com>; Chris Bean <ChrisB@cldengineers.com>; Tidd, Leo <ltidd@louisberger.com>
Subject: I-93 Exit 4A: Town of Chester Land Use and Development Discussion with Andrew Hadik

Andrew,
Thank you for your time today. Following is a summary of our discussion regarding I-93 Exit 4A and the Town of Chester.

In the 2015 Regional Comprehensive Plan, Moving Southern New Hampshire Forward: 2015-2035, the SNHPC projects that Chester will have a 2020 population of 5,404 and a 2040 population of 6,437. You mentioned of not having enough knowledge to dispute those projections, however, believe those numbers to be relatively conservative that there is nothing about Chester's development that would dispute those numbers and stated that Chester is currently experiencing significant growth pressure in the form of single-family residential development. Many of the subdivisions that have been dormant since the 2007-2008 economic downturn have recently restarted development. This resurgence began in Spring 2016. The primary drivers for additional residential development in Chester are good schools and the desire for rural living.

We discussed schools and population growth. Due to the very recent resurgence of residential/subdivision development, it will likely be a year or two before Chester experiences a significant possible increase in elementary school enrollment. At this point, it is too early in the boom cycle to say whether or not there would be a commensurate increase in school-age population/shift in demographics of the population. I would, however, expect to see an increase because most new home buyers in Chester have one or more children.

From a transportation perspective, you stated that growth in the surrounding towns (Auburn, Sandown, and Raymond) has resulted in a noticeable an traffic impact to Chester roadways, specifically the intersection of NH State Routes 121 and 102. At peak rush hour (am and pm), you see significant traffic congestion on SR 121 in both directions.

We discussed the proposed Exit 4A project and whether it would have an effect on growth in Chester. Based on your experience, you believe that Exit 4A will induce additional residential growth in Chester due to improved access to I-93. However, it seems unlikely that Exit 4A would result in a measurable long-term decrease in travel time for Chester residents due to the induced development associated with the project.

Although Exit 4A would enable additional growth in Chester, the Town has a growth management provision in its zoning ordinance that would go into effect if pressure on school, fire, and police services would outstrip the Town's ability to keep pace with development. There is also an open space subdivision provision to encourage subdivisions to be creatively designed in a way that reduces sprawl and protects natural resources and rural character. The most typical type of residential development seen in Chester is still open space subdivisions, however, recently 3 small subdivisions have applied for approval with estate size lots that allow enough space to support horses.

Any comments on the summary of our discussion are appreciated.

Regards,
Kerri

Kerri Snyder, AICP
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I-93 Exit 4A Supplemental Environmental Impact Statement

Land Use Planner Interview Summary – Final 02/22/17

Town of Chester

Following is a summary of the discussion held via telephone on January 27, 2017 between Mr. Dick Trask, Vice Chair, Chester Board of Selectmen and Kerri Snyder (Louis Berger). The purpose of the telephone call was to discuss the revision of the population projections for the Town of Chester.

Mr. Trask sent an e-mail to Leo Tidd (Louis Berger) on January 23, 2017 (Attachment A).

Building Permits

Mr. Trask provided the following information on building permits for the Town of Chester.

Chester currently has approved or pending permits to develop about 300 lots, which are anticipated to be developed in the next 5 to 7 years (2022-2024). The 211 lots shown as currently approved and still under construction on the Town Planning Board website is correct, with regard to approved lots.[1] In addition, the Town has two 30-lot and three 5-lot subdivisions that will be approved in the near future. One of the 30-lot subdivisions is a Phase I – there will likely be an additional 90 lots in that 550-acre subdivision. Table 1 shows the building permits issued since 2013.

Table 1. Chester dwelling units approved

Year	Dwellings Approved
2013	30
2014	27
2015	30
2016	43
2017 (January only)	12

The Chester Master Plan 2015 recognizes a trend for residential growth in Chester. The plan notes that SNHPC projects that approximately 96 dwelling units would be constructed every 5 years through 2050 based on the town's historic growth rate and past building permit trends (Chester Planning Board, 2015). This projection equates to approximately 19 new home permits per year on average over a 35-year period. However, the actual numbers for 2013-2016, as shown above, are higher. Mr. Trask stated that he believes the residential growth trend will continue to mirror the higher rate of development shown in Table 1 over the next 5 to 7 years. There was a general discussion of the previous conversation between Kerri Snyder and Andrew Hadik, Planning Coordinator for the Town of Chester (August 9, 2016). Mr. Hadik stated that many of the previously approved subdivisions had been "dormant" since the 2007-2008

[1] http://www.chesternh.org/boards-committees/planning-board

recession, but that there had been a resurgence (Spring 2016) in development. Mr. Trask agreed with this statement and added that the number of previously approved subdivision plans that were still under construction was a combination of the effects of the recession and the rules regarding impact fees. In Chester, the developer must pay the impact fees at the time the subdivision is approved, which has led to developers applying for subdivision approval with the intention of delaying actual construction until the market is more favorable.

Population Projections

In the August 9, 2016, interview with Mr. Hadik, he indicated that he thought the 2012 Southern New Hampshire Planning Commission (SNHPC) projections were too conservative (i.e. low) but stated that he did not have data at the time to dispute them due to the recent resurgence in growth. Mr. Trask asked that the population projections presented in the draft Land Use Scenarios Technical Report (December 2016) be revisited for Chester in light of the Town's building permit data. The population projections presented in the Land Use Scenarios Technical Report were the 2016 projections developed by NH Office of Energy and Planning (OEP).

Mr. Trask provided information based on a 1:1 dwelling unit to household ratio and estimated household size based on the average number of bedrooms proposed for each of the approved or pending subdivision permits, which yielded a household size of 3. Table 2 includes the population and households for 2014 and 2016 provided in Attachment A and a comparison of the estimated population and households based on the SNHPC occupancy rate (0.96) and OEP household size (3.01). There was an additional adjustment made by SNHPC to increase the revised population number of 4,879 to match the OEP projection of 4,887 to suit the previously run 2015 traffic model – an increase of 8 people. The third-quarter 2016 number was used for the end of 2016. The average annual growth rate of 3.28% is not anticipated to hold as a longer-term trend. For example, the population measured by the U.S. Census Bureau in 2010 was 4,768. The average annual growth rate between 2010 and 2014 (estimate – 5,101) was 1.70%.

Table 2. Chester 2014 and 2016 population and household estimates

	2014		2016		Average Annual Growth Rate 2014-2016
	Households	Population	Households	Population	
Attachment A	1,635	4,905	1,744	5,232	3.28%
Revised	1,570	4,724	1,674	5,039	3.28%

Based on the assumption that the 300 lots are developed by 2023, the Town projects about 2,000 dwelling units (total). Using the SNHPC occupancy rate and OEP household size yields a population projection of 5,779 by 2023 (middle ground in the 5- to 7-year building projection). Based on this projection, the average annual growth rate from 2015 to 2023 is 2.12%.

Table 3 presents the revised population projections for the Town of Chester along with the 2016 OEP projections and 2012 SNHPC projections. Mr. Trask agreed that it was reasonable to apply the average annual growth rate for background population growth from 2015 to 2023 (2.12%)

through the 2025 projection. Looking at 1990-2000 and 2000-2010, the average annual growth rates were 3.49% and 2.32%, respectively for Chester, and these growth rates were higher than the other towns in the study area (see Table 1 in the Land Use Scenarios Technical Report). In addition, the Town of Chester has more available land for development than Derry or Londonderry. Mr. Trask indicated that the Town would like to encourage more senior housing in Chester to alleviate the potential burden on schools and other public services. The Town has growth management and open space provisions in its zoning ordinance. The growth management provision would go into effect if the development pressure on school, fire, and police services exceeds the Town's ability to serve its existing and future populations. The open space provision encourages subdivisions to be designed in a way that reduces sprawl and protects natural resources and rural character. In addition, all of the residential developments in Chester use septic systems, which limits the density of development.

Mr. Trask agreed that under the No Build condition, the Town's rate of development beyond 2025 would likely decrease. As a result, the population projections from 2025 through 2040 used the average annual growth rate projected by OEP. The average annual growth rate for Chester projected by OEP from 2025 to 2040 is 0.25%. The adjusted Town 2040 population projection is 8.9% greater than that projected by OEP in 2016 (and presented in the Draft Land Use Scenarios Technical Report) and 2.9% less than that projected by SNHPC in 2012.

Table 3. Adjusted No Build population projections, Town of Chester

Source	2015[a,b]	2020[c]	2025[d]	2030	2035	2040	Average Annual Growth Rate
2017 Adjusted Town	4,887	5,457	6,027	6,101	6,177	6,253	0.99%
2016 OEP	4,887	5,199	5,536	5,660	5,731	5,744	0.65%
2012 SNHPC	5,096	5,404	5,711	5,982	6,239	6,437	0.94%

Notes:

a. 2015 estimate for adjusted Town is based on the OEP estimate pursuant to a request by SNHPC.
b. 2015 estimate for OEP and SNHPC were generated by the respective agencies.
c. 2020 is based on interpolation between 2015 and 2025.
d. 2025 is based on applying the 2.12% average annual growth rate derived from the 2015-2023 projections. The 2023 projection (5,779) is based on estimated 2,000 dwellings and the SNHPC occupancy rate (0.96) and household size (3.01).

Incremental Impact of the Proposed Project (Exit 4A)

Mr. Trask stated that the primary drivers for residential growth in Chester are access to Pinkerton Academy and the availability of new homes. Mr. Trask agreed that the incremental impact of Exit 4A on residential development would be similar to that described in the draft Land Use Scenarios Technical Report (December 2016) in that the Town of Chester would reach the 2040 population projection earlier under the Build condition than it would under the No Build

condition. Mr. Trask stated that the incremental impact of Exit 4A would be similar to what would be anticipated under the high growth impact scenario as outlined in the draft Land Use Scenarios Technical Report. It was agreed that the incremental impact for the Town of Chester would use the high growth scenario with the updated population projections. Table 4 presents a comparison of the No Build and both the moderate growth and high growth impact scenario populations for Chester. These moderate and high impact growth scenarios assume the same average annual growth rate within the 5-year increments of 1.24% and 1.66%, respectively. Based on the assertion that the incremental impact of the proposed Exit 4A project would be similar to the high growth impact scenario, there are projected to be 1,117 additional people in Chester in 2040 as a result of the proposed project. Using the average household size for Chester (3.01), the additional people yield approximately 371 additional households in 2040 for Chester.

Table 4. Chester 2040 Build condition population growth

Town	Impact Scenario	Population				Population Increase Over No Build in 2040
		2015	2030	2035	2040	
Chester	No Build	4,887	6,101	6,177	**6,253**	NA
	Moderate Growth (Build)	4,887	5,879	**6,253**	6,789	535
	High Growth (Build)	4,887	**6,253**	6,789	7,370	1,117

Attachment A – Chester Growth Estimates

TOWN OF CHESTER
84 Chester Street
Chester, NH 03036
Phone: 603.887.5582 Cell: 603.370.6125
Website: www.chesternh.org

Data showing Chester growth:

Building permits issued:	2013	2014	2015	2016
	30	27	30	42
Households:				
		1635		1744 (as of Sept 2016) ~ 3.3%/ year
Population (est.)		4905		5232

~300 lots proposed or approved expected to be built out within 5-7 years, putting Chester at ~2000 households. [This data does not include lots-of-record that are undeveloped]. This would maintain the average of 3% growth per annum, which is roughly 4.5 times the rate of growth projected by DOT.

Projections: Households by 2020 ~1985 or 260 more than projected by DOT
Population by 2020 ~5955 or 756 more than projected by DOT

DOT Projections:	2015	2020
Households:	1621	1725
Population	4887	5199

Table 3. OEP 2016 population projection by municipality for 2015–2040

Municipality	2015[a]	2020	2025	2030	2035	2040	Average Annual Growth Rate 2015–2040
Derry	32,948	32,459	32,018	32,733	33,144	33,222	0.03%
Londonderry	24,891	25,434	26,057	26,639	26,973	27,036	0.33%
Auburn	5,315	5,560	5,828	5,959	6,033	6,048	0.52%
Chester	4,887	5,199	5,536	5,660	5,731	5,744	0.65%
Sandown	6,255	6,604	6,984	7,140	7,229	7,246	0.59%
Study Area Total	74,296	75,256	76,423	78,131	79,110	79,296	0.26%
Rockingham County	300,569	307,013	314,418	321,441	325,474	326,238	0.33%

Source: OEP (2016a)

[a] 2015 data are an estimate.

Table 4. SNHPC and RPC household projections

Municipality	2010[a]	2015[b]	2020	2025	2030	2035	2040	Average Annual Growth Rate 2015–2040
Derry	12,537	12,656	12,436	12,236	12,496	12,645	12,673	0.01%
Londonderry	8,438	8,628	8,812	9,022	9,219	9,332	9,353	0.32%
Auburn	1,765	1,923	2,012	2,108	2,156	2,182	2,188	0.52%
Chester	1,534	1,621	1,725	1,838	1,879	1,903	1,907	0.65%
Sandown[c]	2,072	2,193	2,321	2,457	2,601	2,753	2,914	1.14%
Study Area Total	26,346	27,021	27,306	27,661	28,350	28,814	29,035	0.29%

Source: SNHPC (2016a), RPC (2015)

[a] 2010 households were provided by SNHPC and based on U.S. Census information.

[b] 2015 data are an estimate.

[c] Data are from the RPC 2015 Regional Master Plan, with 2040 projections based on the "strong, dispersed growth" scenario. Household data were not available for 2015-2035; therefore, this table includes straight-line growth between 2010 and 2040.

A-85

Snyder, Kerri

From: Snyder, Kerri
Sent: Friday, August 26, 2016 9:33 AM
To: 'Mark Traeger'
Cc: Chris Bean; Leo Tidd (ltidd@louisberger.com); I93-Exit4A-EIS (SM) (I93-Exit4A-EIS@louisberger.com)
Subject: RE: I-93 Exit 4A: Town of Sandown Land Use and Development Discussion with Mark Traeger

Mark,
Thank you for reviewing the summary. Following is the updated summary with your changes in bold accepted.
Regards,
Kerri

The current OEP projections show a 2020 population of 6,754 and a 2040 population of 7,070 for Sandown. We discussed historic development trends, specifically Sandown's rapid growth since the 1980s. The primary driver for growth in Sandown is affordable housing – the bulk of housing in Sandown would be considered starter homes with regard to price and size. In addition, access to I-495 and an increase in people who work from home have led to an increase in residential development in Sandown. There was a major influx of people moving to Sandown during the 1990s until the economic downturn in 2007-2008. Sandown has recently seen a resurgence (2016) in development – a 50-unit apartment building was recently approved, and two developments that were initially planned as 55+ are now being developed as any age.

Although Sandown has had growth management ordinances in the past, they no longer have them due to lawsuits by developers. Sandown is now focused on buying and conserving land to reduce the available developable land in the town.
For example, Sandown purchased 200 acres for conserved Open Space that had been approved for 154 55+ dwellings resulting in a reduction of housing potential in Sandown. The Planning Board is considering applying for another CTAP grant to acquire and conserve more land. Most of the larger tracts have been developed, and Sandown has only a couple of 100 acre tracts left that could be developed as larger subdivisions.

Sandown has a lot of wetlands and rivers, and in addition to purchasing land to conserve, the town has a vernal pool protection provision in its zoning ordinance that includes a 25-foot buffer around vernal pools and a building setback requirement of 50 feet. In addition, the Planning Board has passed variable road width and stormwater regulations to reduce impervious surface and to promote Low Impact Development. The conservation measures improve the quality of natural resources and allow the town to reduce the amount of development and the associated increase in school enrollment.

We discussed the widening of I-93, and you stated that it is having a major effect on growth in Sandown by reducing travel times on I-93, which makes Sandown more attractive for young homebuyers. You stated that the proposed Exit 4A would be anticipated to induce additional residential development in Sandown by providing better access and reduced travel time to I-93.

From: Mark Traeger [mailto:markt@eventide.com]
Sent: Friday, August 26, 2016 8:32 AM
To: Snyder, Kerri <KSnyder@louisberger.com>
Subject: RE: I-93 Exit 4A: Town of Sandown Land Use and Development Discussion with Mark Traeger

Kerri,

See my edits in bold below.

You did a great job at distilling a long conversation.

Mark

Mark Traeger
Eventide, Inc.
1 Alsan Way
Little Ferry, NJ 07643
(603) 887-5589 O
(603) 490-5258 C

From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Thursday, August 25, 2016 6:15 PM
To: Mark Traeger <markt@eventide.com>
Cc: Tidd, Leo <ltidd@louisberger.com>; Chris Bean <ChrisB@cldengineers.com>; I93-Exit4A-EIS (SM) <I93-Exit4A-EIS@louisberger.com>
Subject: I-93 Exit 4A: Town of Sandown Land Use and Development Discussion with Mark Traeger

Mark,
Thank you for your time in talking with me today. Following is a summary of our conversation as it relates to Sandown and the proposed I-93 Exit 4A.

The current OEP projections show a 2020 population of 6,754 and a 2040 population of 7,070 for Sandown. We discussed historic development trends, specifically Sandown's rapid growth since the 1980s. The primary driver for growth in Sandown is affordable housing – the bulk of housing in Sandown would be considered starter homes with regard to price and size. In addition, access to I-495 and an increase in people who work from home have led to an increase in residential development in Sandown. There was a major influx of people moving to Sandown during the 1990s until the economic downturn in 2007-2008. Sandown has recently seen a resurgence (2016) in development – a 50-unit apartment building was recently approved, and two developments that were initially planned as 55+ are now being developed as any age.

Although Sandown has had growth management ordinances in the past, they no longer have them due to lawsuits by developers. Sandown is now focused on buying and conserving land to reduce the available developable land in the town.
For example, Sandown purchased **200 acres for conserved Open Space that had been approved for** 154 **55+ dwellings resulting in a reduction of housing potential in Sandown.** The Planning Board is considering applying for another CTAP grant to acquire and conserve more land. Most of the larger tracts have been developed, and Sandown has only a couple of 100 acre tracts left that could be developed as larger subdivisions.

Sandown has a lot of wetlands and rivers, and in addition to purchasing land to conserve, the town has a vernal pool protection provision in its zoning ordinance that includes a 25-foot buffer around vernal pools and a **building setback** requirement of 50 feet. In addition, the Planning Board has **passed variable road width and stormwater regulations to reduce impervious surface and to promote Low Impact Development.** The conservation measures improve the quality of natural resources and allow the town to reduce the amount of development and the associated increase in school enrollment.

We discussed the widening of I-93, and you stated that it is having a major effect on growth in Sandown by reducing travel times on I-93, which makes Sandown more attractive for young homebuyers. You stated that the proposed Exit 4A would be anticipated to induce additional residential development in Sandown by providing better access and reduced travel time to I-93.

Any comments you may have on the summary of our discussion are appreciated.

Regards,
Kerri

Kerri Snyder, AICP
Principal Environmental Planner | Transportation Planning and Environment
Louis Berger
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APPENDIX B: SNHPC DATA AND METHODOLOGY MEMORANDA

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SNHPC DATA AND METHODOLOGY MEMORANDA

E-mail Transmittal of Updated Population and Household Data for Chester B-1
Chester Population, Dwelling Units, and Households Projections by TAZ B-2
E-mail Transmittal of Population and Household Data and Memorandum B-4
Memorandum re: 2015 Model Input – Population and Dwelling Units Data..... B-5
Population, Dwelling Units, and Households Projections by TAZ B-7
Special Population by TAZ..... B-31
Memorandum re: 2015 Model Input – Employment Data..... B-33

From:	Julie Chen
To:	Snyder, Kerri
Cc:	Tidd, Leo; Chris Bean; Paul Konieczka; I93-Exit4A-EIS (SM)
Subject:	RE: I-93 Exit 4A: changes in population projections for Chester
Date:	Tuesday, February 14, 2017 10:50:14 AM
Attachments:	2015-2040 pop HH - Chester.xlsx

Hi Kerri:

Attached please find 2015-2040 population and household distributed based on the number below. If you have any questions, please let me know.

Julie Chen
Southern NH Planning Commission

From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Tuesday, February 14, 2017 10:28 AM
To: Julie Chen
Cc: Tidd, Leo; Chris Bean; Paul Konieczka; I93-Exit4A-EIS (SM)
Subject: RE: I-93 Exit 4A: changes in population projections for Chester

Julie,
Following are the revised numbers for Chester based on your preference to use OEP's 2015 projection.

2015	4,887
2020	5,457
2025	6,027
2030	6,101
2035	6,177
2040	6,253

Please send me the TAZ breakdown for the population when you have allocated it.

Regards,
Kerri

TAZ	TOWN	2015 Pop	HH	2020 Pop	HH	Pop
148	Chester	646	223	708	245	771
149	Chester	427	152	513	182	598
150	Chester	416	161	479	186	541
151	Chester	447	160	521	186	595
152	Chester	1126	328	1297	378	1468
153	Chester	430	148	470	161	510
154	Chester	567	204	595	215	624
155	Chester	829	244	875	258	920
		4887	1621	5457	1811	6027

2025		2030		2035		2040		
HH	Pop	HH	Pop	HH	Pop	HH	HHS2015	
266	779	269	788	272	796	275	2.89	
213	610	217	621	221	632	225	2.81	
210	550	213	558	216	566	220	2.58	
213	604	216	614	220	624	223	2.80	
428	1490	435	1513	441	1535	448	3.43	
175	515	177	520	179	526	180	2.91	
225	627	226	631	228	635	229	2.77	
271	926	273	932	275	938	277	3.39	
2001	6101	2026	6177	2051	6253	2077		

From:	Julie Chen
To:	Snyder, Kerri
Cc:	Tidd, Leo; Hodgson (Rydland), Laura; I93-Exit4A-EIS (SM); Paul Konieczka (PaulK@cldengineers.com); David Preece
Subject:	Population-Household 2015-2040
Date:	Friday, October 21, 2016 9:44:17 AM
Attachments:	2015-2040 Pop HH.pdf 2015-2040 pop HH.xlsx

As I promised, I have allocated OEP population projections to TAZs and calculated numbers of households for TAZs. Attached please find population and households from 2015 through 2040, household size of 2015, and a memo to document methodology .

If you have any questions, please let me know.

Julie Chen
Southern NH Planning Commission

Southern New Hampshire Planning Commission
438 Dubuque Street, Manchester, NH 03102-3546, Telephone (603) 669-4664 Fax (603) 669-4350
www.snhpc.org

MEMORANDUM

TO: File

FROM: Julie Chen, Ph.D., Sr. Transportation Planner, Southern New Hampshire Planning Commission (SNHPC), 669-4664, jchen@SNHPC.org

DATE: October 20, 2016 JC

RE: 2015-2040 Population Distribution to TAZs and Numbers of Households Calculation

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Population Projections Distribution

The population projections from 2015 through 2040 for each community in the region were downloaded from the New Hampshire Office of Energy and Planning (NHOEP) website: http://www.nh.gov/oep/data-center/documents/2016-subcounty-projections-final-report.pdf.

To distribute population changes in five-year increments to TAZs, SNHPC dwelling unit projections adjusted based on 2015 dwelling unit estimates were used. There are two conditions considered as population projections for each community within the region were allocated to TAZs: 1) population increase in a five-year period; 2) Population decrease in a five-year period.

Condition one

When the population increases during a five-year period, the allocation is calculated using the following formula.

$$\Delta P_{TAZ} = \frac{\Delta P_{com}}{\Delta D_{com}} * \Delta D_{TAZ}$$

Where:

ΔP_{TAZ}= population change in a TAZ during a five-year period
ΔP_{com}=Population change in the community in which the TAZ located during the five-year period
ΔD_{TAZ}=Dwelling units change in a TAZ during the five-year period
ΔD_{com}= Dwelling units change in the community in which the TAZ located during the five-year period

Condition two

When the population decreases during a five-year period, the allocation is calculated using the following formula.

$$\Delta P_{TAZ} = \Delta P_{DWTAZ} + (\Delta P_{com} - \Delta P_{DWcom}) * \frac{D_{TAZ}}{D_{com}}$$

Where:

ΔP_{TAZ}= Population change in a TAZ during a five-year period

$\Delta P_{DWTAZ} = HHS_{2015TAZ} * \Delta D_{TAZ}$ =Assume that population change in a TAZ during a five-year period due to dwelling units change

$HHS_{2015TAZ}$= 2015 household size within the TAZ

ΔP_{com}= Increase of population in the community in which the TAZ located during the 5-year period

$\Delta P_{com} = \sum \Delta P_{TAZ}$= Population change in the community in which the TAZ located during the five-year period due to dwelling units change

D_{TAZ}=Dwelling units in the TAZ at the end of the five-year period

D_{DWcom} = Dwelling units in the cummunity in which the TAZ located at end of the five − year period

Population within a TAZ at end of a five-year period was calculated as follows.

$$P_{TAZ} = P_{TAZ-1} + \Delta P_{TAZ}$$

Where:

P_{TAZ} =Population in the TAZ at end of the five-year period

P_{TAZ-1} =Population in the TAZ at end of the prior five-year period

Number of Household Calculation

Numbers of households for TAZs were calculated using the following formula.

$$HH_{TAZ} = (P_{TAZ} - P_{specialTAZ})/HHS_{2015}$$

Where:

HH_{TAZ}= Number of households in a TAZ

$P_{specialTAZ}$= Special population in the TAZ

$HHS_{2015TAZ}$= Household size in the TAZ

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
71	Auburn	58	30	60	31	62	32
72	Auburn	2159	796	2252	831	2354	868
73	Auburn	998	345	1062	367	1131	391
74	Auburn	932	320	969	332	1009	346
98	Auburn	1167	432	1217	451	1271	471
89	Bedford	1028	350	1052	359	1079	369
90	Bedford	271	95	295	103	322	112
91	Bedford	2100	664	2173	687	2254	712
92	Bedford	1539	475	1624	501	1718	530
93	Bedford	260	87	297	100	337	113
94	Bedford	128	49	126	48	123	47
95	Bedford	1613	791	1796	891	1998	1001
104	Bedford	1622	505	1695	529	1776	556
105	Bedford	1777	550	1825	565	1879	582
106	Bedford	1308	412	1369	431	1436	452
107	Bedford	611	224	623	228	637	233
108	Bedford	548	195	560	199	574	204
109	Bedford	770	308	807	323	847	340
110	Bedford	1405	524	1417	530	1431	536
238	Bedford	514	157	660	202	821	251
239	Bedford	826	266	887	285	954	307
240	Bedford	302	115	314	120	328	125
241	Bedford	49	18	55	21	62	23
242	Bedford	1157	364	1218	383	1285	404
243	Bedford	900	302	961	322	1028	345
244	Bedford	202	64	214	68	228	72
245	Bedford	1783	591	1808	599	1835	608
246	Bedford	292	149	301	153	310	158
289	Bedford	605	174	629	181	656	189
290	Bedford	624	185	746	221	880	261
173	Candia	283	117	275	114	268	111
174	Candia	506	193	495	189	485	185
175	Candia	345	128	355	132	366	136
176	Candia	431	152	444	156	457	161
177	Candia	914	336	891	327	871	320
178	Candia	199	75	194	73	190	72
179	Candia	628	243	629	243	632	244
180	Candia	307	116	305	116	304	115
181	Candia	296	104	302	106	308	108
148	Chester	646	223	680	235	717	248
149	Chester	427	152	474	169	525	187
150	Chester	416	161	450	175	487	189
151	Chester	447	160	487	174	531	190
152	Chester	1126	328	1219	356	1320	385

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
71	Auburn	63	32	64	33	64	33
72	Auburn	2404	887	2432	897	2438	899
73	Auburn	1165	403	1185	410	1189	411
74	Auburn	1029	353	1040	357	1042	357
98	Auburn	1297	480	1312	486	1315	487
89	Bedford	1089	372	1095	375	1097	376
90	Bedford	332	116	338	118	340	119
91	Bedford	2283	721	2301	727	2307	729
92	Bedford	1752	541	1773	547	1780	549
93	Bedford	351	118	360	121	363	122
94	Bedford	122	47	121	46	121	46
95	Bedford	2069	1041	2114	1065	2130	1074
104	Bedford	1804	566	1822	572	1829	574
105	Bedford	1898	588	1910	592	1914	593
106	Bedford	1460	460	1475	465	1480	466
107	Bedford	642	235	645	236	646	236
108	Bedford	579	205	582	206	583	207
109	Bedford	861	346	870	350	873	351
110	Bedford	1435	538	1438	540	1439	540
238	Bedford	879	268	915	279	927	283
239	Bedford	978	315	993	320	998	321
240	Bedford	332	127	335	128	336	128
241	Bedford	64	24	66	24	66	25
242	Bedford	1309	412	1324	417	1329	418
243	Bedford	1052	353	1067	358	1072	360
244	Bedford	232	73	235	74	237	75
245	Bedford	1844	611	1850	613	1852	613
246	Bedford	313	160	315	161	316	161
289	Bedford	666	191	672	193	674	194
290	Bedford	928	275	958	284	969	287
173	Candia	272	112	275	113	275	114
174	Candia	493	188	497	190	498	190
175	Candia	379	140	386	143	387	144
176	Candia	472	166	480	169	482	170
177	Candia	883	324	889	327	890	327
178	Candia	193	73	194	73	195	73
179	Candia	649	251	659	255	661	256
180	Candia	311	118	315	119	316	120
181	Candia	316	111	321	113	322	113
148	Chester	731	252	739	255	740	256
149	Chester	543	193	554	197	556	198
150	Chester	501	194	509	197	510	198
151	Chester	547	196	556	199	558	200
152	Chester	1357	396	1379	402	1383	403

TAZ	TOWN	HHS2015
71	Auburn	1.96
72	Auburn	2.71
73	Auburn	2.89
74	Auburn	2.92
98	Auburn	2.70
89	Bedford	2.67
90	Bedford	2.87
91	Bedford	3.16
92	Bedford	3.24
93	Bedford	2.97
94	Bedford	2.61
95	Bedford	1.83
104	Bedford	3.02
105	Bedford	3.23
106	Bedford	3.18
107	Bedford	2.73
108	Bedford	2.82
109	Bedford	2.38
110	Bedford	2.13
238	Bedford	3.27
239	Bedford	3.11
240	Bedford	2.63
241	Bedford	2.68
242	Bedford	3.18
243	Bedford	2.98
244	Bedford	3.16
245	Bedford	3.02
246	Bedford	1.96
289	Bedford	3.48
290	Bedford	3.38
173	Candia	2.42
174	Candia	2.62
175	Candia	2.70
176	Candia	2.84
177	Candia	2.72
178	Candia	2.65
179	Candia	2.59
180	Candia	2.64
181	Candia	2.85
148	Chester	2.89
149	Chester	2.81
150	Chester	2.58
151	Chester	2.80
152	Chester	3.43

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
153	Chester	430	148	452	155	475	163
154	Chester	567	204	582	210	599	216
155	Chester	829	244	854	252	881	260
182	Deerfield	593	198	633	211	675	225
183	Deerfield	481	166	511	177	545	188
184	Deerfield	432	152	460	162	491	173
185	Deerfield	463	186	483	194	504	202
186	Deerfield	362	125	386	133	412	142
187	Deerfield	492	187	507	193	524	200
188	Deerfield	416	141	438	148	462	157
189	Deerfield	504	184	522	191	541	198
190	Deerfield	257	102	268	106	280	111
191	Deerfield	413	140	424	143	436	148
121	Derry	2338	806	2295	791	2256	778
122	Derry	809	276	796	271	783	267
123	Derry	837	260	838	260	839	261
124	Derry	1040	543	996	520	955	499
125	Derry	3	2	3	2	3	2
126	Derry	552	289	528	276	506	265
127	Derry	1088	463	1056	448	1027	435
128	Derry	882	282	917	293	952	304
129	Derry	422	143	416	141	410	139
130	Derry	674	258	661	253	648	248
131	Derry	1352	609	1309	588	1269	568
132	Derry	719	316	716	314	713	313
133	Derry	70	24	73	25	76	26
134	Derry	616	269	605	264	595	260
135	Derry	743	397	714	381	687	367
136	Derry	2418	1089	2342	1055	2272	1023
137	Derry	530	206	529	205	528	205
138	Derry	1411	491	1380	480	1350	470
139	Derry	1162	366	1145	360	1130	355
140	Derry	445	152	475	162	504	172
141	Derry	863	304	861	304	860	303
142	Derry	804	279	810	281	817	284
143	Derry	845	264	843	263	842	262
144	Derry	1519	553	1495	544	1473	537
145	Derry	372	137	382	141	393	145
146	Derry	1477	486	1466	483	1456	479
147	Derry	2091	672	2107	677	2124	683
221	Derry	712	299	685	288	660	277
222	Derry	863	385	830	371	800	357
223	Derry	445	167	432	162	419	157
224	Derry	841	401	812	387	786	375

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
153	Chester	484	166	489	168	490	168
154	Chester	605	218	609	220	610	220
155	Chester	891	263	897	264	898	265
182	Deerfield	695	232	706	236	708	236
183	Deerfield	560	194	569	197	570	197
184	Deerfield	505	178	514	181	515	181
185	Deerfield	514	206	519	209	521	209
186	Deerfield	424	146	431	149	432	149
187	Deerfield	532	203	536	204	537	205
188	Deerfield	473	160	479	162	480	163
189	Deerfield	549	201	554	203	555	203
190	Deerfield	285	113	288	114	289	115
191	Deerfield	441	149	444	151	445	151
121	Derry	2284	788	2301	793	2304	794
122	Derry	794	271	800	273	801	273
123	Derry	863	268	877	272	879	273
124	Derry	957	500	958	500	958	500
125	Derry	3	2	3	2	3	2
126	Derry	506	265	507	265	507	265
127	Derry	1037	440	1043	442	1045	443
128	Derry	1016	325	1053	336	1060	339
129	Derry	417	142	421	143	422	144
130	Derry	659	252	665	254	666	255
131	Derry	1283	575	1291	579	1293	580
132	Derry	748	329	769	338	773	339
133	Derry	82	28	85	29	85	29
134	Derry	616	269	629	275	631	276
135	Derry	701	375	710	379	711	380
136	Derry	2297	1034	2311	1041	2314	1042
137	Derry	549	213	562	218	564	219
138	Derry	1361	473	1367	476	1368	476
139	Derry	1144	360	1152	363	1154	363
140	Derry	554	189	583	199	588	201
141	Derry	889	314	905	319	908	320
142	Derry	853	296	874	303	877	304
143	Derry	863	269	876	273	878	274
144	Derry	1509	550	1529	557	1533	558
145	Derry	422	156	438	162	441	163
146	Derry	1488	490	1507	496	1510	497
147	Derry	2203	708	2248	722	2257	725
221	Derry	661	277	661	277	661	278
222	Derry	800	357	801	357	801	357
223	Derry	420	157	420	158	420	158
224	Derry	796	380	802	383	804	383

TAZ	TOWN	HHS2015
153	Chester	2.91
154	Chester	2.77
155	Chester	3.39
182	Deerfield	3.00
183	Deerfield	2.89
184	Deerfield	2.84
185	Deerfield	2.49
186	Deerfield	2.90
187	Deerfield	2.47
188	Deerfield	2.95
189	Deerfield	2.73
190	Deerfield	2.52
191	Deerfield	2.87
121	Derry	2.90
122	Derry	2.93
123	Derry	3.22
124	Derry	1.91
125	Derry	1.46
126	Derry	1.91
127	Derry	2.22
128	Derry	3.13
129	Derry	2.94
130	Derry	2.61
131	Derry	2.05
132	Derry	2.28
133	Derry	2.92
134	Derry	2.29
135	Derry	1.87
136	Derry	2.22
137	Derry	2.57
138	Derry	2.87
139	Derry	3.18
140	Derry	2.93
141	Derry	2.83
142	Derry	2.88
143	Derry	3.21
144	Derry	2.75
145	Derry	2.70
146	Derry	3.04
147	Derry	3.11
221	Derry	2.38
222	Derry	2.24
223	Derry	2.67
224	Derry	2.10

		2015		2020		2025	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
225	Derry	414	167	404	163	395	159
226	Derry	1226	406	1206	399	1187	393
227	Derry	645	215	640	213	635	212
228	Derry	689	283	670	275	653	268
83	Goffstown	822	302	845	311	876	322
84	Goffstown	801	278	812	282	826	287
85	Goffstown	1302	494	1310	497	1321	501
86	Goffstown	803	316	807	318	813	320
87	Goffstown	639	129	658	136	683	144
88	Goffstown	3360	1369	3368	1372	3380	1377
111	Goffstown	751	288	763	293	780	299
112	Goffstown	1200	510	1214	516	1234	524
113	Goffstown	692	269	698	271	707	274
114	Goffstown	1295	596	1303	600	1315	605
234	Goffstown	639	207	665	215	702	227
235	Goffstown	1169	377	1199	387	1242	401
236	Goffstown	1736	49	1738	50	1741	51
237	Goffstown	754	262	760	264	769	267
286	Goffstown	1102	489	1111	493	1122	499
287	Goffstown	558	194	575	199	598	207
288	Goffstown	222	77	224	78	227	79
10	Hooksett	2436	1048	2603	1120	2802	1206
18	Hooksett	2364	716	2411	735	2466	759
75	Hooksett	2034	645	2164	687	2319	736
76	Hooksett	843	307	890	324	945	344
77	Hooksett	913	353	941	364	974	377
78	Hooksett	1602	559	1741	608	1907	666
79	Hooksett	615	267	671	291	737	320
80	Hooksett	921	374	972	395	1033	420
81	Hooksett	464	182	575	226	708	278
82	Hooksett	1176	399	1260	428	1360	462
96	Hooksett	985	342	1050	365	1127	392
97	Hooksett	121	50	125	52	131	55
64L	Londonderry	0	0	0	0	0	0
65	Londonderry	137	46	137	46	138	46
66	Londonderry	236	97	241	99	247	102
67	Londonderry	1473	621	1487	626	1502	633
68	Londonderry	1830	678	1841	682	1854	687
69	Londonderry	58	18	62	19	67	21
70	Londonderry	577	183	585	186	595	188
99	Londonderry	842	289	853	293	865	298
100	Londonderry	1620	522	1695	546	1781	574
101	Londonderry	2690	844	2771	869	2865	899
102	Londonderry	2276	736	2341	757	2416	781

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
225	Derry	402	162	406	164	407	164
226	Derry	1202	398	1210	401	1211	401
227	Derry	650	216	658	219	659	220
228	Derry	660	271	664	273	665	273
83	Goffstown	915	336	939	345	948	349
84	Goffstown	844	293	855	297	859	298
85	Goffstown	1336	507	1345	510	1348	511
86	Goffstown	820	323	824	325	826	325
87	Goffstown	715	155	735	162	742	164
88	Goffstown	3394	1383	3403	1386	3406	1388
111	Goffstown	802	307	815	312	820	314
112	Goffstown	1259	535	1274	542	1280	544
113	Goffstown	717	279	724	281	726	282
114	Goffstown	1329	612	1338	616	1341	617
234	Goffstown	748	242	777	252	787	255
235	Goffstown	1295	419	1328	430	1340	434
236	Goffstown	1745	52	1747	53	1748	53
237	Goffstown	779	271	786	273	788	274
286	Goffstown	1136	506	1145	510	1148	512
287	Goffstown	626	217	644	223	650	225
288	Goffstown	230	80	233	81	233	81
10	Hooksett	2906	1251	2986	1285	3039	1308
18	Hooksett	2495	771	2517	780	2532	786
75	Hooksett	2400	761	2462	781	2503	794
76	Hooksett	974	355	996	363	1011	368
77	Hooksett	992	383	1005	388	1014	392
78	Hooksett	1994	696	2061	719	2104	734
79	Hooksett	772	335	799	347	816	354
80	Hooksett	1064	433	1089	443	1105	449
81	Hooksett	778	306	831	327	866	340
82	Hooksett	1412	479	1452	493	1478	502
96	Hooksett	1168	406	1199	417	1219	424
97	Hooksett	134	56	136	57	137	57
64L	Londonderry	0	0	0	0	0	0
65	Londonderry	139	46	139	47	139	47
66	Londonderry	253	104	257	106	257	106
67	Londonderry	1517	639	1525	642	1527	643
68	Londonderry	1865	691	1872	694	1873	694
69	Londonderry	71	22	73	23	74	23
70	Londonderry	603	191	608	193	609	193
99	Londonderry	877	302	884	304	885	304
100	Londonderry	1861	600	1907	614	1916	617
101	Londonderry	2952	926	3002	942	3012	945
102	Londonderry	2486	804	2526	817	2533	819

TAZ	TOWN	HHS2015
225	Derry	2.48
226	Derry	3.02
227	Derry	3.00
228	Derry	2.44
83	Goffstown	2.72
84	Goffstown	2.82
85	Goffstown	2.61
86	Goffstown	2.54
87	Goffstown	2.95
88	Goffstown	2.41
111	Goffstown	2.61
112	Goffstown	2.35
113	Goffstown	2.58
114	Goffstown	2.17
234	Goffstown	3.09
235	Goffstown	2.99
236	Goffstown	2.86
237	Goffstown	2.88
286	Goffstown	2.00
287	Goffstown	2.88
288	Goffstown	2.88
10	Hooksett	2.32
18	Hooksett	2.37
75	Hooksett	3.15
76	Hooksett	2.74
77	Hooksett	2.59
78	Hooksett	2.87
79	Hooksett	2.30
80	Hooksett	2.46
81	Hooksett	2.54
82	Hooksett	2.95
96	Hooksett	2.88
97	Hooksett	2.40
64L	Londonderry	0.00
65	Londonderry	2.98
66	Londonderry	2.43
67	Londonderry	2.37
68	Londonderry	2.70
69	Londonderry	3.21
70	Londonderry	3.15
99	Londonderry	2.91
100	Londonderry	3.10
101	Londonderry	3.19
102	Londonderry	3.09

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
103	Londonderry	1347	434	1358	438	1370	442
229	Londonderry	1186	369	1218	379	1256	390
230	Londonderry	197	79	200	80	203	81
231	Londonderry	155	53	160	54	167	57
232	Londonderry	957	294	968	297	980	301
233	Londonderry	956	296	1004	311	1061	329
274	Londonderry	362	106	373	109	385	113
275	Londonderry	845	309	872	319	903	330
276	Londonderry	1304	531	1342	547	1386	565
277	Londonderry	20	7	23	8	26	9
278	Londonderry	263	98	268	100	275	102
279	Londonderry	551	172	556	174	563	176
280	Londonderry	304	181	309	184	315	188
281	Londonderry	1152	396	1185	407	1222	420
282	Londonderry	578	220	583	222	590	224
283	Londonderry	815	313	818	314	821	315
284	Londonderry	22	11	23	11	23	12
285	Londonderry	1767	600	1783	605	1802	612
1	Manchester	5337	2305	5344	2308	5408	2336
2	Manchester	1617	631	1618	631	1620	632
3	Manchester	427	178	427	178	428	178
4	Manchester	1508	610	1508	610	1511	611
5	Manchester	718	323	718	323	718	323
6	Manchester	2675	1572	2677	1504	2704	1520
7	Manchester	4154	2089	4164	2155	4263	2207
8	Manchester	1385	648	1388	649	1423	665
9	Manchester	3292	1460	3292	1460	3293	1460
11	Manchester	6038	2422	6038	2422	6043	2424
12	Manchester	2335	1038	2336	1038	2338	1039
13	Manchester	1854	767	1855	767	1860	769
14	Manchester	1372	656	1373	656	1378	659
15	Manchester	2168	904	2168	904	2169	905
16	Manchester	209	131	209	131	209	131
17	Manchester	399	191	399	152	399	152
19	Manchester	267	137	267	198	267	198
20	Manchester	262	109	262	109	262	109
21	Manchester	477	191	478	191	479	191
22	Manchester	881	377	881	358	881	358
23	Manchester	442	190	443	211	445	212
24	Manchester	714	389	714	389	714	389
25	Manchester	92	29	92	29	92	29
26	Manchester	401	246	401	222	406	225
27	Manchester	923	467	923	432	923	432
28	Manchester	377	170	377	95	377	95

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
103	Londonderry	1382	446	1388	448	1390	448
229	Londonderry	1290	401	1311	407	1314	409
230	Londonderry	206	83	207	83	208	83
231	Londonderry	172	59	176	60	176	60
232	Londonderry	992	304	998	306	1000	307
233	Londonderry	1113	345	1143	354	1149	356
274	Londonderry	397	116	404	118	405	118
275	Londonderry	932	341	949	347	952	348
276	Londonderry	1426	581	1450	591	1454	593
277	Londonderry	29	10	30	11	31	11
278	Londonderry	280	104	284	106	284	106
279	Londonderry	568	177	572	178	572	179
280	Londonderry	321	191	324	193	325	193
281	Londonderry	1257	432	1277	439	1281	440
282	Londonderry	595	227	599	228	599	228
283	Londonderry	824	316	826	317	826	317
284	Londonderry	24	12	24	12	24	12
285	Londonderry	1819	618	1829	621	1831	622
1	Manchester	5684	2455	5857	2530	5917	2556
2	Manchester	1631	636	1637	639	1640	640
3	Manchester	430	179	431	180	432	180
4	Manchester	1521	615	1528	618	1530	619
5	Manchester	719	323	720	324	720	324
6	Manchester	2821	1589	2895	1632	2920	1647
7	Manchester	4688	2427	4955	2565	5047	2613
8	Manchester	1572	735	1665	779	1697	794
9	Manchester	3297	1462	3300	1463	3301	1464
11	Manchester	6064	2433	6078	2438	6082	2440
12	Manchester	2349	1044	2355	1047	2358	1048
13	Manchester	1881	778	1894	783	1899	785
14	Manchester	1399	669	1412	675	1417	677
15	Manchester	2173	907	2176	908	2177	908
16	Manchester	209	131	209	131	209	131
17	Manchester	401	153	403	154	403	154
19	Manchester	267	198	267	198	267	198
20	Manchester	262	109	262	109	262	109
21	Manchester	483	193	485	194	486	195
22	Manchester	881	358	881	358	881	358
23	Manchester	456	217	462	221	465	222
24	Manchester	714	389	714	389	714	389
25	Manchester	94	30	96	30	96	30
26	Manchester	428	238	441	247	446	249
27	Manchester	923	432	923	432	923	432
28	Manchester	377	95	377	95	377	95

TAZ	TOWN	HHS2015
103	Londonderry	3.10
229	Londonderry	3.22
230	Londonderry	2.49
231	Londonderry	2.94
232	Londonderry	3.26
233	Londonderry	3.23
274	Londonderry	3.42
275	Londonderry	2.74
276	Londonderry	2.45
277	Londonderry	2.86
278	Londonderry	2.69
279	Londonderry	3.20
280	Londonderry	1.68
281	Londonderry	2.91
282	Londonderry	2.63
283	Londonderry	2.61
284	Londonderry	2.00
285	Londonderry	2.95
1	Manchester	2.32
2	Manchester	2.56
3	Manchester	2.40
4	Manchester	2.47
5	Manchester	2.22
6	Manchester	1.70
7	Manchester	1.93
8	Manchester	2.14
9	Manchester	2.26
11	Manchester	2.49
12	Manchester	2.25
13	Manchester	2.42
14	Manchester	2.09
15	Manchester	2.40
16	Manchester	1.59
17	Manchester	2.09
19	Manchester	1.35
20	Manchester	2.40
21	Manchester	2.50
22	Manchester	2.34
23	Manchester	2.10
24	Manchester	1.83
25	Manchester	3.17
26	Manchester	1.63
27	Manchester	1.89
28	Manchester	1.61

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
29	Manchester	1835	695	1835	793	1835	793
30	Manchester	2288	989	2288	989	2288	989
31	Manchester	923	478	924	403	926	405
32	Manchester	464	297	465	432	469	437
33	Manchester	442	339	442	250	443	251
34	Manchester	562	251	563	317	563	317
35	Manchester	1170	444	1170	444	1170	444
36	Manchester	1390	557	1390	557	1390	558
37	Manchester	932	392	932	343	932	343
38	Manchester	971	410	971	447	978	450
39	Manchester	1145	435	1145	393	1146	393
40	Manchester	2123	877	2126	943	2156	956
41	Manchester	1406	579	1407	579	1409	580
42	Manchester	784	414	784	415	786	416
43	Manchester	656	238	656	238	657	238
44	Manchester	594	183	594	183	594	183
45	Manchester	606	181	606	181	608	181
46	Manchester	292	110	293	-113	295	-112
47	Manchester	890	123	890	368	890	368
48	Manchester	464	161	464	161	464	161
49	Manchester	1102	415	1103	415	1105	415
50	Manchester	1372	567	1372	567	1373	567
51	Manchester	1588	643	1589	597	1589	597
52	Manchester	2472	990	2473	1038	2475	1039
53	Manchester	701	275	702	276	707	278
54	Manchester	213	46	213	46	214	46
55	Manchester	3040	1201	3044	1202	3078	1216
56	Manchester	638	245	639	245	644	247
57	Manchester	1582	607	1583	607	1585	608
58	Manchester	2702	1118	2702	1093	2702	1093
59	Manchester	625	260	626	288	636	293
60	Manchester	4167	1621	4168	1621	4174	1623
61	Manchester	25	15	25	15	25	15
62	Manchester	5	4	5	4	5	4
63	Manchester	2226	759	2228	760	2245	766
64	Manchester	0	0	0	0	0	0
115	Manchester	297	102	297	120	298	120
116	Manchester	1839	828	1839	829	1842	830
117	Manchester	2075	834	2076	550	2085	554
118	Manchester	1947	507	1948	796	1954	799
119	Manchester	1570	611	1574	612	1608	625
120	Manchester	1186	488	1186	488	1186	488
247	Manchester	38	19	38	19	38	19
248	Manchester	251	125	251	117	252	117

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
29	Manchester	1835	793	1835	793	1835	793
30	Manchester	2288	989	2288	989	2288	989
31	Manchester	937	410	943	414	946	415
32	Manchester	491	457	504	469	509	474
33	Manchester	445	252	446	253	447	254
34	Manchester	564	317	564	318	565	318
35	Manchester	1170	444	1170	444	1170	444
36	Manchester	1392	559	1394	559	1394	559
37	Manchester	932	343	932	343	932	343
38	Manchester	1004	463	1021	471	1027	474
39	Manchester	1150	395	1153	396	1154	396
40	Manchester	2283	1013	2363	1048	2391	1061
41	Manchester	1420	584	1426	587	1429	588
42	Manchester	796	421	802	424	804	425
43	Manchester	664	241	668	242	669	243
44	Manchester	594	183	594	183	594	183
45	Manchester	615	184	620	185	621	185
46	Manchester	303	-109	308	-107	310	-107
47	Manchester	890	368	890	368	890	368
48	Manchester	464	161	464	161	464	161
49	Manchester	1114	419	1120	421	1122	422
50	Manchester	1375	568	1376	569	1377	569
51	Manchester	1591	598	1593	598	1593	598
52	Manchester	2486	1044	2492	1047	2495	1048
53	Manchester	728	286	741	291	746	293
54	Manchester	219	47	221	48	222	48
55	Manchester	3227	1274	3320	1311	3353	1324
56	Manchester	665	255	678	260	683	262
57	Manchester	1596	612	1602	614	1605	615
58	Manchester	2702	1093	2702	1094	2702	1094
59	Manchester	678	312	705	324	714	329
60	Manchester	4199	1633	4215	1639	4221	1642
61	Manchester	25	15	25	15	25	15
62	Manchester	5	4	5	4	5	4
63	Manchester	2320	791	2366	807	2382	813
64	Manchester	0	0	0	0	0	0
115	Manchester	302	122	305	123	306	123
116	Manchester	1855	836	1863	839	1865	840
117	Manchester	2122	569	2145	578	2154	582
118	Manchester	1982	810	1999	817	2005	819
119	Manchester	1757	683	1850	720	1882	732
120	Manchester	1188	489	1190	490	1190	490
247	Manchester	38	19	38	19	38	19
248	Manchester	254	118	255	119	256	119

TAZ	TOWN	HHS2015
29	Manchester	2.32
30	Manchester	2.31
31	Manchester	1.93
32	Manchester	1.07
33	Manchester	1.30
34	Manchester	1.78
35	Manchester	2.64
36	Manchester	2.49
37	Manchester	2.38
38	Manchester	2.08
39	Manchester	2.55
40	Manchester	2.25
41	Manchester	2.43
42	Manchester	1.89
43	Manchester	2.76
44	Manchester	3.25
45	Manchester	3.35
46	Manchester	2.65
47	Manchester	2.42
48	Manchester	2.88
49	Manchester	2.66
50	Manchester	2.42
51	Manchester	2.47
52	Manchester	2.38
53	Manchester	2.55
54	Manchester	4.64
55	Manchester	2.53
56	Manchester	2.61
57	Manchester	2.61
58	Manchester	2.42
59	Manchester	2.17
60	Manchester	2.57
61	Manchester	1.70
62	Manchester	1.20
63	Manchester	2.93
64	Manchester	0.00
115	Manchester	2.48
116	Manchester	2.22
117	Manchester	2.49
118	Manchester	2.45
119	Manchester	2.57
120	Manchester	2.43
247	Manchester	2.01
248	Manchester	2.01

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
249	Manchester	368	227	368	237	368	237
250	Manchester	312	251	312	251	312	251
251	Manchester	172	107	172	107	175	109
252	Manchester	254	69	254	69	254	69
253	Manchester	199	132	199	132	199	132
254	Manchester	137	122	137	122	137	122
255	Manchester	408	205	408	205	408	205
256	Manchester	497	277	497	277	497	277
257	Manchester	212	76	212	76	212	76
258	Manchester	1169	331	1169	331	1170	331
259	Manchester	893	316	893	316	894	316
260	Manchester	1254	451	1254	451	1254	451
261	Manchester	1708	687	1708	687	1710	688
262	Manchester	573	255	573	255	574	256
263	Manchester	1410	608	1410	608	1410	608
264	Manchester	665	256	665	256	665	256
265	Manchester	458	198	458	198	459	198
266	Manchester	889	516	889	516	889	516
267	Manchester	2477	990	2477	990	2477	990
268	Manchester	130	57	130	57	130	57
269	Manchester	264	109	264	109	264	109
270	Manchester	1126	533	1129	534	1154	546
271	Manchester	1364	817	1364	817	1367	819
272	Manchester	445	172	445	172	445	172
273	Manchester	112	58	112	58	112	58
192	New Boston	707	268	739	276	775	290
193	New Boston	399	153	413	162	429	169
194	New Boston	458	165	483	174	511	184
195	New Boston	402	153	435	165	471	178
196	New Boston	433	162	447	167	463	173
197	New Boston	581	210	624	226	671	243
198	New Boston	504	182	569	205	641	231
199	New Boston	894	295	966	318	1045	344
200	New Boston	393	140	414	148	438	157
201	New Boston	687	250	726	264	770	280
156	Raymond	530	194	542	198	556	203
157	Raymond	1036	404	1050	410	1068	417
158	Raymond	818	276	828	279	840	284
159	Raymond	1024	349	1037	354	1053	359
160	Raymond	411	146	419	145	427	148
161	Raymond	658	230	664	235	671	238
162	Raymond	510	221	515	223	520	225
163	Raymond	434	201	441	205	450	209
164	Raymond	345	151	346	152	348	152

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
249	Manchester	368	237	368	237	368	237
250	Manchester	312	251	312	251	312	251
251	Manchester	190	119	200	124	203	126
252	Manchester	256	69	256	70	256	70
253	Manchester	199	132	199	132	199	132
254	Manchester	138	123	139	124	139	124
255	Manchester	409	206	410	206	410	206
256	Manchester	497	277	497	277	497	277
257	Manchester	213	77	214	77	214	77
258	Manchester	1171	331	1171	332	1172	332
259	Manchester	899	318	903	319	904	320
260	Manchester	1256	452	1258	452	1258	452
261	Manchester	1716	690	1720	692	1721	692
262	Manchester	579	258	583	260	584	260
263	Manchester	1413	609	1414	609	1414	610
264	Manchester	665	256	665	256	665	256
265	Manchester	463	200	466	201	467	202
266	Manchester	889	516	889	517	889	517
267	Manchester	2477	990	2477	990	2477	990
268	Manchester	130	57	130	57	130	57
269	Manchester	264	109	264	109	264	109
270	Manchester	1260	596	1326	628	1349	639
271	Manchester	1377	825	1384	829	1386	830
272	Manchester	445	172	445	172	445	172
273	Manchester	112	59	112	59	113	59
192	New Boston	786	294	793	297	795	297
193	New Boston	434	170	437	172	438	172
194	New Boston	519	187	525	188	527	189
195	New Boston	481	182	488	185	490	186
196	New Boston	468	175	471	176	472	176
197	New Boston	686	248	695	251	698	252
198	New Boston	662	239	676	244	680	245
199	New Boston	1069	352	1084	357	1089	359
200	New Boston	445	159	450	161	451	161
201	New Boston	783	285	791	288	794	289
156	Raymond	574	210	585	214	587	215
157	Raymond	1092	426	1105	431	1108	432
158	Raymond	857	289	867	292	868	293
159	Raymond	1074	367	1086	371	1088	371
160	Raymond	439	152	446	154	447	155
161	Raymond	680	241	686	243	687	244
162	Raymond	527	228	531	230	532	230
163	Raymond	461	214	468	217	469	218
164	Raymond	351	153	352	154	352	154

TAZ	TOWN	HHS2015
249	Manchester	1.55
250	Manchester	1.24
251	Manchester	1.60
252	Manchester	3.68
253	Manchester	1.51
254	Manchester	1.12
255	Manchester	1.99
256	Manchester	1.79
257	Manchester	2.77
258	Manchester	3.53
259	Manchester	2.83
260	Manchester	2.78
261	Manchester	2.49
262	Manchester	2.24
263	Manchester	2.32
264	Manchester	2.60
265	Manchester	2.31
266	Manchester	1.72
267	Manchester	2.50
268	Manchester	2.28
269	Manchester	2.43
270	Manchester	2.11
271	Manchester	1.67
272	Manchester	2.59
273	Manchester	1.92
192	New Boston	2.64
193	New Boston	2.55
194	New Boston	2.78
195	New Boston	2.64
196	New Boston	2.67
197	New Boston	2.77
198	New Boston	2.77
199	New Boston	3.03
200	New Boston	2.80
201	New Boston	2.75
156	Raymond	2.73
157	Raymond	2.56
158	Raymond	2.96
159	Raymond	2.93
160	Raymond	2.82
161	Raymond	2.82
162	Raymond	2.31
163	Raymond	2.15
164	Raymond	2.28

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
165	Raymond	458	188	476	195	496	204
166	Raymond	402	153	403	154	405	154
167	Raymond	522	194	544	202	570	212
168	Raymond	612	224	618	226	625	229
169	Raymond	293	115	293	115	293	115
170	Raymond	969	385	978	388	990	393
171	Raymond	895	347	908	353	924	359
172	Raymond	340	182	340	183	341	183
202	Weare	645	221	657	225	671	230
203	Weare	448	143	452	145	458	146
204	Weare	324	111	329	113	335	115
205	Weare	395	159	408	164	423	170
206	Weare	507	197	522	202	539	209
207	Weare	404	151	416	155	430	160
208	Weare	644	229	664	236	686	244
209	Weare	696	245	712	251	732	257
210	Weare	437	168	449	172	463	178
211	Weare	433	170	445	175	460	181
212	Weare	428	179	457	191	491	205
213	Weare	293	113	305	118	319	123
214	Weare	607	197	626	204	649	211
215	Weare	434	157	441	160	450	163
216	Weare	264	110	268	112	274	114
217	Weare	405	141	415	144	426	148
218	Weare	475	155	492	160	512	167
219	Weare	550	195	562	199	576	204
220	Weare	422	159	430	162	440	166
291	Windham	2736	947	2910	1007	3098	1072
292	Windham	1545	484	1615	487	1690	511
293	Windham	498	189	538	204	581	222
294	Windham	2140	738	2400	853	2680	953
295	Windham	636	266	691	283	750	308
296	Windham	2797	1012	3150	1146	3530	1285
297	Windham	1030	377	1067	391	1108	405
298	Windham	399	162	426	173	455	185
299	Windham	2521	840	2617	871	2720	906
300	Francestown	248	92	249	93	250	93
301	Francestown	250	104	253	105	256	107
302	Francestown	148	62	150	62	152	63
303	Francestown	189	67	190	67	192	68
304	Francestown	471	184	477	186	486	190
305	Francestown	256	104	258	105	260	106
375	Londonderry	0	0	0	0	0	0
376	Londonderry	374	127	378	128	383	130

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
165	Raymond	525	216	541	222	544	223
166	Raymond	408	155	409	156	409	156
167	Raymond	606	225	626	232	630	234
168	Raymond	634	232	640	234	641	235
169	Raymond	294	115	294	115	294	115
170	Raymond	1005	399	1013	402	1015	403
171	Raymond	945	367	957	372	960	373
172	Raymond	342	184	343	184	343	184
202	Weare	680	233	686	235	688	236
203	Weare	462	148	464	148	465	149
204	Weare	338	116	341	117	341	117
205	Weare	433	174	440	177	442	178
206	Weare	549	213	556	216	559	217
207	Weare	439	164	445	166	447	167
208	Weare	701	249	710	252	713	253
209	Weare	745	262	753	265	756	266
210	Weare	472	181	477	183	479	184
211	Weare	469	184	474	186	476	187
212	Weare	512	214	526	219	531	221
213	Weare	328	127	333	129	335	130
214	Weare	663	216	672	219	676	220
215	Weare	455	165	458	166	460	166
216	Weare	278	116	280	117	281	117
217	Weare	433	151	438	152	439	153
218	Weare	524	171	532	174	535	175
219	Weare	585	207	591	209	593	210
220	Weare	447	168	451	170	452	170
291	Windham	3156	1092	3190	1104	3196	1106
292	Windham	1714	518	1727	523	1730	523
293	Windham	595	228	602	231	604	232
294	Windham	2767	984	2816	1001	2826	1005
295	Windham	768	315	778	320	780	321
296	Windham	3647	1327	3715	1352	3728	1357
297	Windham	1120	410	1128	413	1129	413
298	Windham	464	188	470	190	471	191
299	Windham	2752	916	2770	922	2774	924
300	Francestown	253	94	254	94	255	95
301	Francestown	262	109	265	111	267	111
302	Francestown	156	65	158	66	159	66
303	Francestown	194	69	196	69	196	69
304	Francestown	500	195	508	198	511	199
305	Francestown	263	107	265	108	266	108
375	Londonderry	0	0	0	0	0	0
376	Londonderry	387	131	389	132	390	132

TAZ	TOWN	HHS2015
165	Raymond	2.44
166	Raymond	2.63
167	Raymond	2.69
168	Raymond	2.73
169	Raymond	2.55
170	Raymond	2.52
171	Raymond	2.58
172	Raymond	1.86
202	Weare	2.92
203	Weare	3.13
204	Weare	2.92
205	Weare	2.49
206	Weare	2.58
207	Weare	2.68
208	Weare	2.81
209	Weare	2.84
210	Weare	2.61
211	Weare	2.54
212	Weare	2.40
213	Weare	2.58
214	Weare	3.07
215	Weare	2.76
216	Weare	2.40
217	Weare	2.87
218	Weare	3.06
219	Weare	2.82
220	Weare	2.66
291	Windham	2.89
292	Windham	3.19
293	Windham	2.33
294	Windham	2.81
295	Windham	2.39
296	Windham	2.75
297	Windham	2.73
298	Windham	2.47
299	Windham	3.00
300	Francestown	2.69
301	Francestown	2.40
302	Francestown	2.40
303	Francestown	2.83
304	Francestown	2.56
305	Francestown	2.46
375	Londonderry	0.00
376	Londonderry	2.94

TAZ	TOWN	2015 Pop	2015 HH	2020 Pop	2020 HH	2025 Pop	2025 HH
377	Derry	8	2	9	2	11	3
378	Derry	315	154	303	148	292	143
379	Derry	416	134	426	137	436	141
380	Derry	278	103	271	100	264	98
381	Derry	15	5	14	5	14	5

		2030		2035		2040	
TAZ	TOWN	Pop	HH	Pop	HH	Pop	HH
377	Derry	12	3	13	3	13	3
378	Derry	292	143	293	143	293	143
379	Derry	460	148	473	152	476	153
380	Derry	265	98	266	99	266	99
381	Derry	14	5	14	5	14	5

TAZ	TOWN	HHS2015
377	Derry	3.96
378	Derry	2.05
379	Derry	3.10
380	Derry	2.70
381	Derry	2.96

From:	Julie Chen
To:	Snyder, Kerri
Cc:	Tidd, Leo; Chris Bean; I93-Exit4A-EIS (SM); Hodgson (Rydland), Laura; David Preece
Subject:	RE: I-93 Exit 4A: Data for Average Household Size
Date:	Tuesday, August 23, 2016 1:16:57 PM
Attachments:	special population.xlsx

Hi Kerri:

I calculated household size based on population, housing units, and occupancy rate (2010). The equation is as follow.

Household size= (Population – special population)/(housing units*occupancy rate)
Occupancy rate(2010)=2010 housing units/2010 household

Attached please find special population data I used.

If you have any questions, please let me know.

Julie Chen

From: Snyder, Kerri [mailto:KSnyder@louisberger.com]
Sent: Tuesday, August 23, 2016 11:48 AM
To: Julie Chen
Cc: Tidd, Leo; Chris Bean; I93-Exit4A-EIS (SM); Hodgson (Rydland), Laura
Subject: I-93 Exit 4A: Data for Average Household Size

Julie,
To follow up on my call/message for you this morning, I wanted to get your input what data you used for average household size in the 2015 population and household updates. The travel demand model methodology appears to have used U.S. Census household size (from 2010). Did you use the U.S. Census household size for your 2015 data? If so, did you use the Town-level or more detailed level (e.g., census block group)? If not, more detailed information on what was used is appreciated. We want to make sure we are consistent with your analysis.

Regards,
Kerri

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Southern New Hampshire Planning Commission
438 Dubuque Street, Manchester, NH 03102-3546, Telephone (603) 669-4664 Fax (603) 669-4350
www.snhpc.org

MEMORANDUM

TO: File

FROM: Julie Chen, Ph.D., Sr. Transportation Planner, Southern New Hampshire Planning Commission, 669-4664, jchen@SNHPC.org JC

DATE: November 4, 2016

RE: 2015-2040 – Employment Projection for I-93 Exit 4A project

---

In order to reflect changes in employment between 2010 and 2015, the original SNHPC employment projection for 2010 through 2040 (completed in 2012) was adjusted for 2020 through 2040 projection. Three steps are followed in calculating 2015-2040 employment projection.

Step 1: Growth rates

The study assumes that employment growth rates by employment category group for 2015-2040 were kept the same as the 2012 Southern NH Planning Commission employment projection for 2010-2040 which were reviewed by corresponding communities in the region. The following formula was used in calculating growth rates over a five-year interval.

$$GR_{Com\ EC\ i} = (E_{2012\ Com\ EC\ i} - E_{2012\ Com\ EC\ i-1})/E_{2012\ Com\ EC\ i-1}$$

Where:

i =projection years 2015, 2020, 2025, 2030, 2035 and 2040

$GR_{Com\ EC\ i}$=Growth rate by employment category group over i to i-1 five-year interval

$E_{2012\ com\ EC\ i}$ = Total employment for an employment category group in a community at projection year i in 2012 projection

$E_{2012\ com\ EC\ i-1}$=Total employment for the employment category group in community at projection year i-1 in 2012 projection

Step 2: Total employment projection for an employment category group in a community 2020 through 2040

The 2015 total employment estimate for an employment category group in a community was considered as base, total employment projections for the employment category group in the community 2020 through 2040 were calculated as follows:

$$E_{2016\ Com\ EC\ i} = E_{2016\ Com\ EC\ i-1} * (1 + GR_{Com\ EC\ i})$$

Where:

i =projection years 2020,2025,2030,2035 and 2040

$E_{2016\ com\ EC\ i}$ = Total employment for an employment category group in the community at projection year i in the 2016 projection

$E_{2016\ com\ EC\ i-1}$=Total employment for the employment category group in the community at projection year i-1 in the 2016 projection

Step 3: Total employment for an employment category group in the community for 2020-2040 projection distributed to TAZs

Two conditions were used as total projected employment for an employment category group in the community was allocated into TAZs.

Condition one

When developable land for a land use category is available and appropriate to use in a community, employment is distributed based on percentage of developable land in a TAZ in total of developable land in the community.

$$E_{2016\ TAZ\ EC\ i} = E_{2016\ TAZ\ EC\ i-1} + (E_{2016\ Com\ EC\ i} - E_{2016\ Com\ EC\ i-1}) * Percentage$$

Where:

$E_{2016\ TAZ\ EC\ i}$=2016 Employment projection in a TAZ for an employment category group at projection year i

$E_{2016\ TAZ\ EC\ i-1}$=2016 Employment projection in a TAZ for the employment category group at projection year i-1 in the 2016 projection

$E_{2016\ com\ EC\ i}$ = Total employment for the employment category group in the community at projection year i in the 2016 projection

$E_{2016\ com\ EC\ i-1}$=Total employment for the employment category group in the community at projection year i-1 in the 2016 projection

Condition two

When developable land for the land use category is not available or not appropriate to use in a community, employment in a TAZ is calculated using same growth rate as that of employment of the employment category.

$$E_{2016\ TAZ\ EC\ i} = E_{2016\ TAZ\ EC\ i-1} * (1 + GR_{2016\ Com\ EC\ i})$$

Where:

$E_{2016\ TAZ\ EC\ i}$=2016 Employment projection in a TAZ for an employment category group at projection year i

$E_{2016\ TAZ\ EC\ i-1}$=2016 Employment projection in a TAZ for the employment category group at projection year i-1 in the 2016 projection

Preparer's note: Employment data were provided on November 7, 2016. Pursuant to an agreement signed with NHDOT and SNHPC, the raw data are not available for public distribution.

APPENDIX C: MEMORANDUM: REVIEW OF EMPLOYMENT PROJECTIONS

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Memorandum

DATE: November 23, 2016

TO: File

FROM: Gabor Debreczeni

SUBJECT: I-93 Exit 4A: Review of Employment Projections

Introduction

This memo is a brief evaluation of employment projections by the Southern New Hampshire Planning Commission for the towns of Auburn, Chester, Derry, Londonderry, and Sandown, all in Rockingham County, through 2040.

SNHPC Projections

The table below shows SNHPC's projection for the annual growth rate of employment from 2015 to 2040 for each of the five towns as well as for the collective study area. These projections were calculated from two inputs: historical growth rates for 1990-2010 (sourced from the New Hampshire Economic and Labor Market Information Bureau, NHELMIB), and a ten-year (2008-2018) employment projection by NHELMIB.

Table 1: Study Area Employment Growth Projection by Town

Area	CAGR, 2015-40
Derry	0.90%
Londonderry	0.84%
Auburn	1.63%
Chester	2.24%
Sandown	0.99%
Total Study Area	0.95%

Review of Historical Trends

Historical data for employment (defined by location of work rather than location of residence) and population growth from the U.S. Census Bureau[1] was reviewed by Louis Berger for 2003-2014, the time range for which data was available at the town level. The table below shows the annual growth rate of employment for this period for the five towns, the study area, Rockingham County, and New Hampshire.

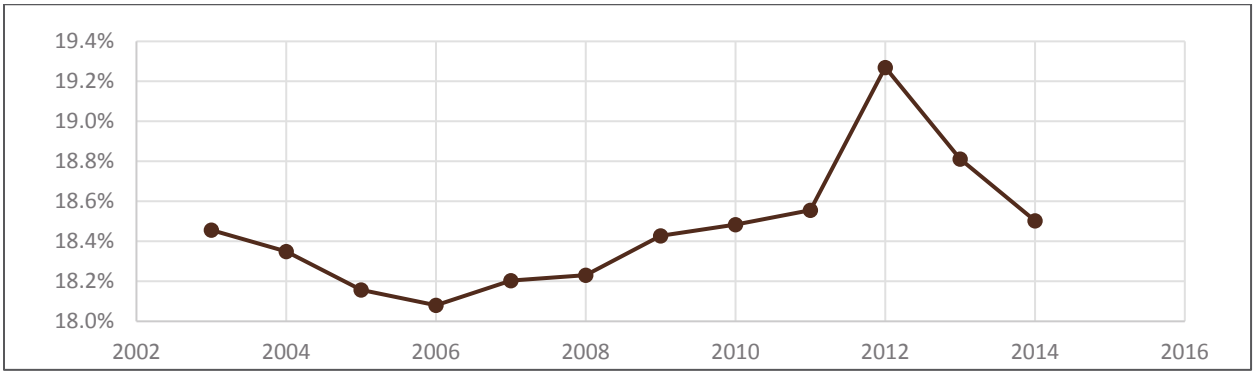
Historical data was also reviewed from Woods & Poole, a firm specializing in county-level economic projections. Employment data from Woods & Poole measures the number of full- and part-time jobs by location of work.

Table 2: Employment Growth History

Area	U.S. Census Bureau CAGR, 2003-14	Woods & Poole CAGR, 2003-14	Woods & Poole CAGR, 1969-2015
Derry	0.53%		
Londonderry	0.61%		
Auburn	1.90%		
Chester	-0.80%		
Sandown	4.09%		
Total Study Area	0.67%		
Rockingham Co.	0.65%	0.96%	3.19%
New Hampshire	0.54%	0.54%	2.08%

The chart below shows the share of Rockingham County employment (place-of-work) that is located within the study area, for the 2003-14 period. As can be seen, the share varies from 18% to just over 19%, but there is no clear trend of rising or declining share over time.

Figure 1: Study Area Employment as a Proportion of County Employment



[1] Specifically, the employment data was collected from the Longitudinal Employer-Household Dynamics section (http://onthemap.ces.census.gov/), while population data was collected from the American FactFinder section (http://factfinder.census.gov/) and the City and Town Intercensal Estimates section (https://www.census.gov/popest/data/intercensal/cities/cities2010.html).

The charts below show the patterns of employment as implied by historical data sourced from the U.S. Census Bureau as well as SNHPC's projected growth rates through 2040, for each of the five towns in the study area. A comparable chart for the entire study area is at the end of this document.

Figure 2: Auburn Employment History and Projection

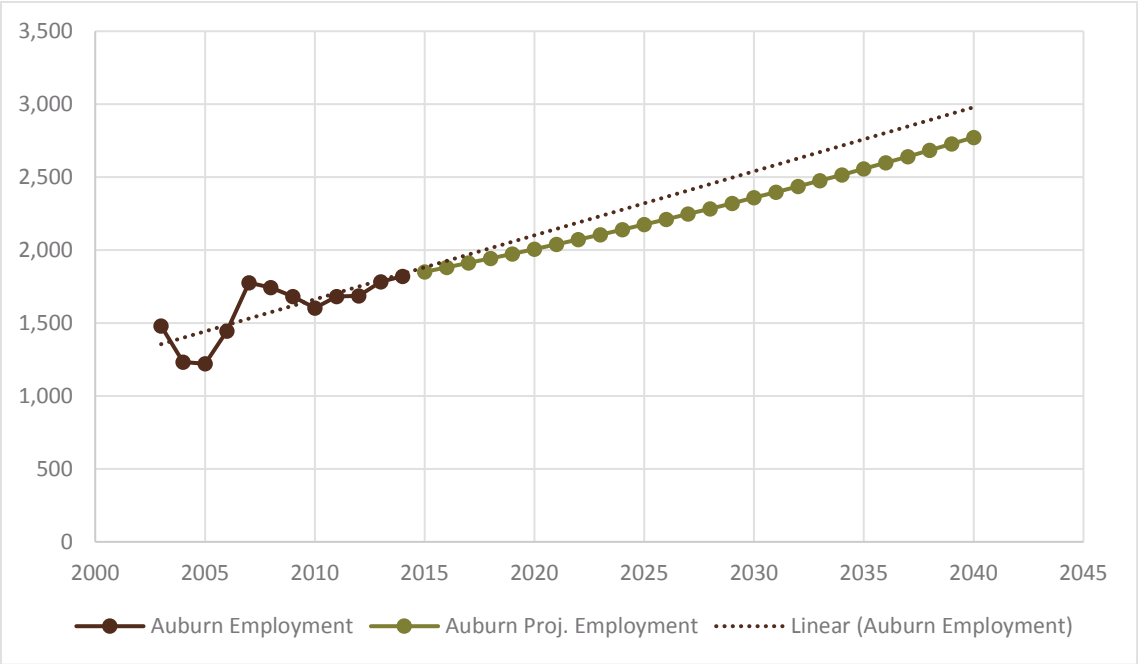


Figure 3: Sandown Employment History and Projection

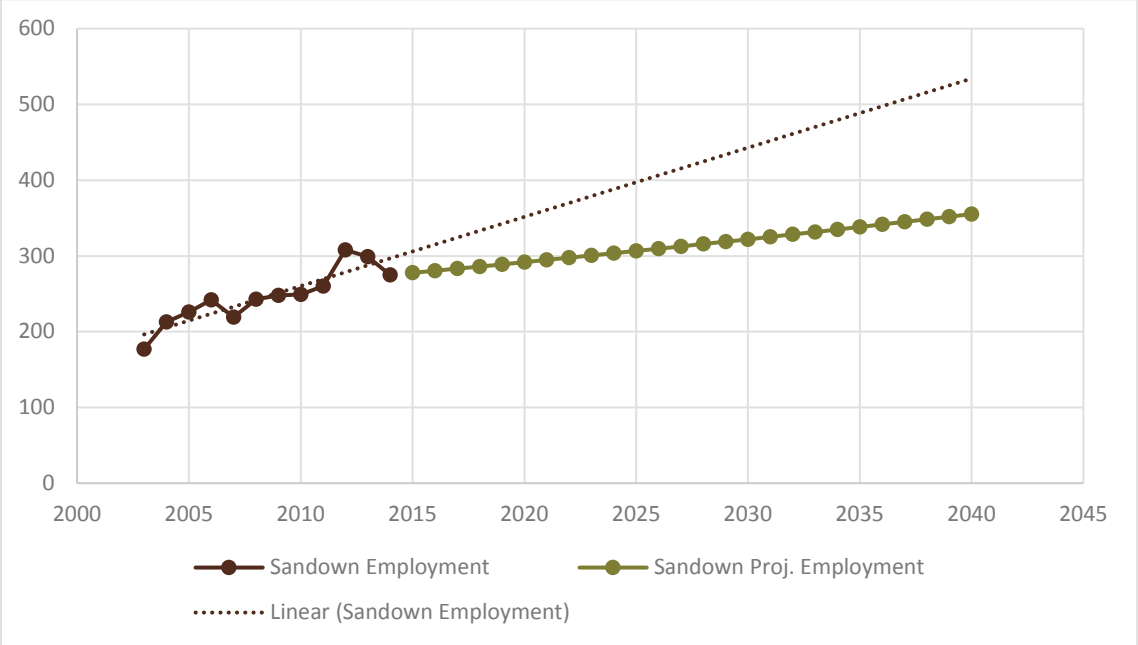


Figure 4: Londonderry Employment History and Projection

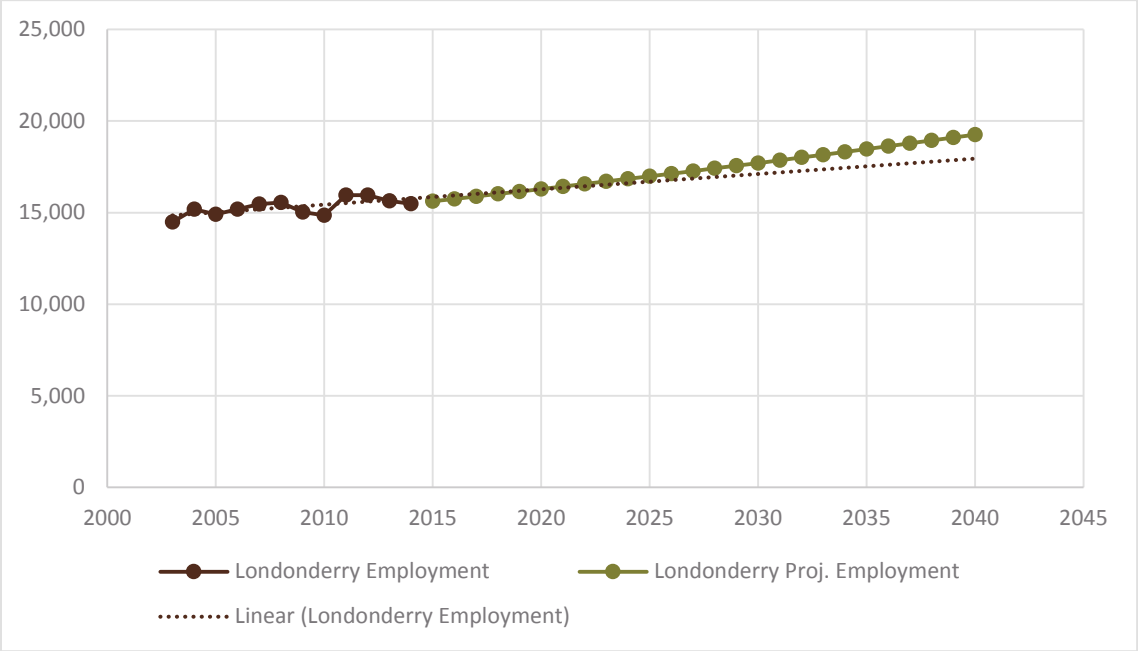
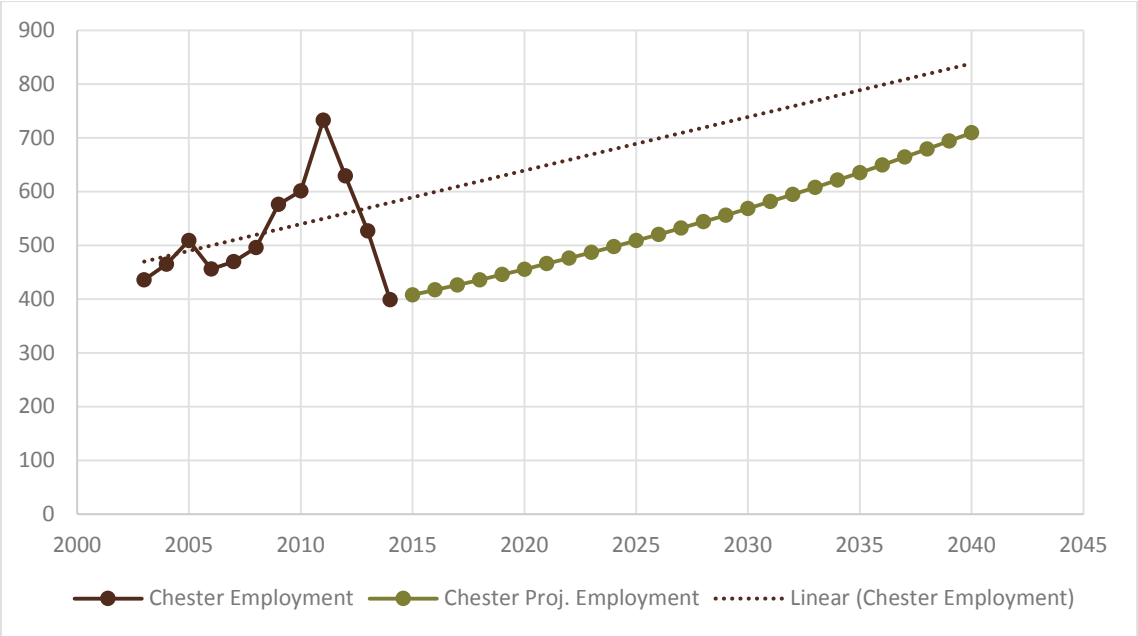


Figure 5: Derry Employment History and Projection

Figure 6: Chester Employment History and Projection



Overall the trajectory of projected employment is generally consistent with past patterns of growth in each town, with future growth rates at or below the linear trend in employment growth from 2003 to 2015.

The downward trend in employment in Chester as of 2012 is ascribed in the Land Use Scenarios Technical Report to the closing of Chester College, which is expected to reopen as a new education institution in 2020.

In Derry, the growth projection is somewhat higher than the linear trend of employment growth since 2003, but consistent with the rate of growth seen in employment following the recovery from the recession in 2011.

Historical Models for Employment within Study Area

To further assess the reasonableness of the regional employment growth projection, we conducted an evaluation of the historical relationship of employment growth in the study area to employment growth in the county and state as a whole. As a benchmark we also obtained an independent projection of county and state level employment through 2040.

Using the 2003-14 U.S. Census Bureau data referenced above, we developed simple regression models to investigate relationships between growth rates in employment in the study area, population in the study area, employment in Rockingham County, and employment in New Hampshire. Two models were found to have the most predictive power – one relating study area employment to county-level employment, and a

second relating it to county-level employment and study area population.

The tables below show information about the regression models. The logarithm of both the input and output data were taken for both regression models.

Table 3: Regression Model 1: Regional Employment as a Function of County Employment

```
Call:
lm(formula = Com_Emp ~ Roc_Emp, data = log_added_data)

Residuals:
      Min        1Q    Median        3Q       Max
-0.019492 -0.009596 -0.004990  0.005649  0.041969

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -0.1689     2.9563  -0.057  0.95556
Roc_Emp       0.8717     0.2494   3.496  0.00577 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01802 on 10 degrees of freedom
Multiple R-squared:  0.5499,    Adjusted R-squared:  0.5049
F-statistic: 12.22 on 1 and 10 DF,  p-value: 0.00577
```

The first regression model indicates that regional employment levels are closely correlated with the overall level of employment in Rockingham County. The model indicates that annual growth in employment at the county level at a rate of 1.00% can be expected to result in regional employment growth at a rate of 0.87%.

Table 4: Regression Model 2: Regional Employment as a Function of County Employment and Regional Population

```
Call:
lm(formula = Com_Emp ~ Roc_Emp + Com_Pop, data = log_added_data)

Residuals:
      Min        1Q    Median        3Q       Max
-0.020428 -0.009262 -0.001961  0.006356  0.032042

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -17.4068    10.0300  -1.735   0.1167
Roc_Emp       0.5693     0.2825   2.015   0.0747 .
Com_Pop       1.8589     1.0423   1.783   0.1082
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01632 on 9 degrees of freedom
Multiple R-squared:  0.6674,    Adjusted R-squared:  0.5935
F-statistic: 9.032 on 2 and 9 DF,  p-value: 0.007053
```

The second regression model indicates that regional employment levels are closely correlated with the overall level of employment in Rockingham County along with the level of population in the region. This model indicates that employment in the region can be expected to grow at a rate of 0.57 times the rate of county employment growth and 1.86 times the rate of regional population growth.

Other Benchmark Employment Projections

As shown in the table below, for the 2015-40 period, Woods & Poole projects a yearly growth rate of approximately 1.1% for both New Hampshire and Rockingham County, which is the smallest geographical area relevant to this memo that is projected by Woods & Poole. (As a point of comparison, Woods & Poole projects an annual population growth rate of 0.69% for New Hampshire and 0.85% for Rockingham County during this time period.)

Table 5: Woods & Poole Employment Projection

Area	CAGR, 2015-40
Rockingham Co.	1.07%
New Hampshire	1.06%

Using the Woods & Poole projections as an input, the Regression Model 1 (considering only Rockingham County employment as an input) would suggest an average growth rate of **0.93%** per year through 2040 (1.07% * 0.87 = 0.93%).

Regression Model 2 considers both Rockingham County employment and study area population as inputs. The latter is the Office of Energy and Planning (OEP) population projection, which indicates that Rockingham County is estimated to have an annual growth rate of 0.26% through 2040. As such, this model predicts an employment growth rate of **1.09%** per year through 2040 (0.26% * 1.86 + 1.07% * 0.57).

Conclusion

SNHPC's projection for employment growth in the study area appears to be reasonable. The projected growth rate through 2040 aligns with Woods & Poole's projection for employment growth in Rockingham County, and both regression models suggest study area employment growth rates that are comparable to the rate of growth implied by the SNHPC projection, as shown in Table 6, below.

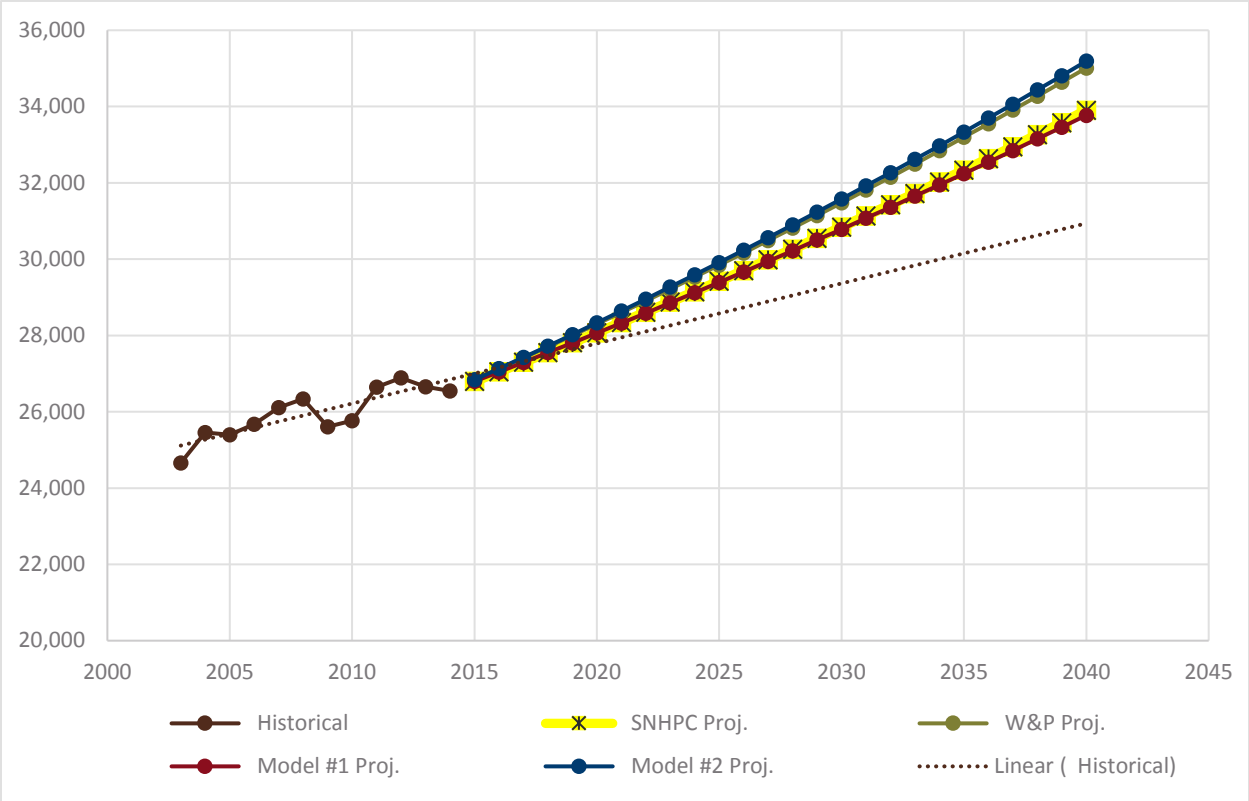
Table 6: Study Area Employment Growth Rate Comparison

	SHNPC	Model #1	Model #2	Woods & Poole (Rockingham Co.)
2015-40 Employment CAGR	0.95%	0.93%	1.09%	1.07%

While it is notable that the study area employment growth rate is forecasted to be substantially greater than the study area population growth rate (which is pegged at a CAGR of 0.26%), a third regression model attempting to predict study area employment by using only study area population as an input showed that for each 1% increase in population, we would expect a 3.1% increase in employment.

The chart below shows the patterns of study area employment based on historical place of work employment as reported by the U.S. Census Bureau; and four projections through 2040 based on growth rates from sources discussed in this memorandum: the SNHPC projection, the two regression models described above, and Woods & Poole projections for Rockingham County.

Figure 7: Historical and Projected Study Area Employment



APPENDIX D: TAZ ALLOCATION UNDER THE NO BUILD AND BUILD CONDITIONS

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TAZ ALLOCATION UNDER THE NO BUILD AND BUILD CONDITIONS

2040 Total Build Condition for Alternatives A and B D-1
2040 Total Build Condition for Alternatives C and D D-3
2040 Total No Build Condition and Build Condition for Alternative F D-5

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2040 Total Build Condition for Alternatives A and B

TAZ	TOWN	2040 Pop	2040 HH
71	Auburn	64	33
72	Auburn	2438	899
73	Auburn	1189	411
74	Auburn	1042	357
98	Auburn	1315	487
148	Chester	917	315
149	Chester	758	267
150	Chester	770	288
151	Chester	768	271
152	Chester	1776	528
153	Chester	629	214
154	Chester	728	260
155	Chester	1023	305
121	Derry	2304	794
122	Derry	801	273
123	Derry	879	273
124	Derry	958	500
125	Derry	3	2
126	Derry	507	265
127	Derry	1045	443
128	Derry	1060	339
129	Derry	422	144
130	Derry	666	255
131	Derry	1293	580
132	Derry	773	339
133	Derry	85	29
134	Derry	631	276
135	Derry	711	380
136	Derry	2314	1042
137	Derry	564	219
138	Derry	1368	476
139	Derry	1154	363
140	Derry	588	201
141	Derry	908	320
142	Derry	877	304
143	Derry	878	274
144	Derry	1533	558
145	Derry	441	163
146	Derry	1510	497
147	Derry	2257	725
221	Derry	661	278
222	Derry	801	357
223	Derry	420	158

Town	2040 Pop	2040 HH
Auburn	6048	2188
Chester	7370	2448
Derry	33,222	12,673
Londonderry	30,910	10,707

224	Derry	804	383
225	Derry	407	164
226	Derry	1211	401
227	Derry	659	220
228	Derry	665	273
64L	Londonderry	0	0
65	Londonderry	139	47
66	Londonderry	257	106
67	Londonderry	1527	643
68	Londonderry	1873	694
69	Londonderry	599	207
70	Londonderry	609	193
99	Londonderry	1707	591
100	Londonderry	1916	617
101	Londonderry	3012	945
102	Londonderry	2533	819
103	Londonderry	1390	448
229	Londonderry	1314	409
230	Londonderry	208	83
231	Londonderry	176	60
232	Londonderry	1000	307
233	Londonderry	1149	356
274	Londonderry	405	118
275	Londonderry	952	348
276	Londonderry	1454	593
277	Londonderry	2174	760
278	Londonderry	284	106
279	Londonderry	572	179
280	Londonderry	325	193
281	Londonderry	1281	440
282	Londonderry	599	228
283	Londonderry	826	317
284	Londonderry	24	12
285	Londonderry	1831	622
375	Londonderry	384	134
376	Londonderry	390	132
377	Derry	13	3
378	Derry	293	143
379	Derry	476	153
380	Derry	266	99
381	Derry	14	5

2040 Total Build Condition for Alternatives C and D

TAZ	TOWN	2040 Pop	2040 HH
71	Auburn	64	33
72	Auburn	2438	899
73	Auburn	1189	411
74	Auburn	1042	357
98	Auburn	1315	487
148	Chester	917	315
149	Chester	758	267
150	Chester	770	288
151	Chester	768	271
152	Chester	1776	528
153	Chester	629	214
154	Chester	728	260
155	Chester	1023	305
121	Derry	2304	794
122	Derry	801	273
123	Derry	879	273
124	Derry	958	500
125	Derry	3	2
126	Derry	507	265
127	Derry	1045	443
128	Derry	1060	339
129	Derry	422	144
130	Derry	666	255
131	Derry	1293	580
132	Derry	773	339
133	Derry	85	29
134	Derry	631	276
135	Derry	711	380
136	Derry	2314	1042
137	Derry	564	219
138	Derry	1368	476
139	Derry	1154	363
140	Derry	588	201
141	Derry	908	320
142	Derry	877	304
143	Derry	878	274
144	Derry	1533	558
145	Derry	441	163
146	Derry	1510	497
147	Derry	2257	725
221	Derry	661	278
222	Derry	801	357
223	Derry	420	158

Town	2040 Pop	2040 HH
Auburn	6048	2188
Chester	7370	2448
Derry	33,222	12,673
Londonderry	30,885	10,698

224	Derry	804	383
225	Derry	407	164
226	Derry	1211	401
227	Derry	659	220
228	Derry	665	273
64L	Londonderry	0	0
65	Londonderry	139	47
66	Londonderry	257	106
67	Londonderry	1527	643
68	Londonderry	1873	694
69	Londonderry	594	205
70	Londonderry	609	193
99	Londonderry	1698	588
100	Londonderry	1916	617
101	Londonderry	3012	945
102	Londonderry	2533	819
103	Londonderry	1390	448
229	Londonderry	1314	409
230	Londonderry	208	83
231	Londonderry	176	60
232	Londonderry	1000	307
233	Londonderry	1149	356
274	Londonderry	405	118
275	Londonderry	952	348
276	Londonderry	1454	593
277	Londonderry	2166	757
278	Londonderry	284	106
279	Londonderry	572	179
280	Londonderry	325	193
281	Londonderry	1281	440
282	Londonderry	599	228
283	Londonderry	826	317
284	Londonderry	24	12
285	Londonderry	1831	622
375	Londonderry	381	133
376	Londonderry	390	132
377	Derry	13	3
378	Derry	293	143
379	Derry	476	153
380	Derry	266	99
381	Derry	14	5

2040 Total Under the No Build Condition. Also applies to Build Alternative F.

		2040	
TAZ	TOWN	Pop	HH
71	Auburn	64	33
72	Auburn	2438	899
73	Auburn	1189	411
74	Auburn	1042	357
98	Auburn	1315	487
148	Chester	796	275
149	Chester	632	225
150	Chester	566	220
151	Chester	624	223
152	Chester	1535	448
153	Chester	526	180
154	Chester	635	229
155	Chester	938	277
121	Derry	2304	794
122	Derry	801	273
123	Derry	879	273
124	Derry	958	500
125	Derry	3	2
126	Derry	507	265
127	Derry	1045	443
128	Derry	1060	339
129	Derry	422	144
130	Derry	666	255
131	Derry	1293	580
132	Derry	773	339
133	Derry	85	29
134	Derry	631	276
135	Derry	711	380
136	Derry	2314	1042
137	Derry	564	219
138	Derry	1368	476
139	Derry	1154	363
140	Derry	588	201
141	Derry	908	320
142	Derry	877	304
143	Derry	878	274
144	Derry	1533	558
145	Derry	441	163
146	Derry	1510	497
147	Derry	2257	725
221	Derry	661	278
222	Derry	801	357
223	Derry	420	158

	2040	
Town	Pop	HH
Auburn	6048	2188
Chester	6253	2077
Derry	33,222	12,673
Londonderry	30,885	10,698

224	Derry	804	383
225	Derry	407	164
226	Derry	1211	401
227	Derry	659	220
228	Derry	665	273
64L	Londonderry	0	0
65	Londonderry	139	47
66	Londonderry	257	106
67	Londonderry	1527	643
68	Londonderry	1873	694
69	Londonderry	594	205
70	Londonderry	609	193
99	Londonderry	1698	588
100	Londonderry	1916	617
101	Londonderry	3012	945
102	Londonderry	2533	819
103	Londonderry	1390	448
229	Londonderry	1314	409
230	Londonderry	208	83
231	Londonderry	176	60
232	Londonderry	1000	307
233	Londonderry	1149	356
274	Londonderry	405	118
275	Londonderry	952	348
276	Londonderry	1454	593
277	Londonderry	2166	757
278	Londonderry	284	106
279	Londonderry	572	179
280	Londonderry	325	193
281	Londonderry	1281	440
282	Londonderry	599	228
283	Londonderry	826	317
284	Londonderry	24	12
285	Londonderry	1831	622
375	Londonderry	381	133
376	Londonderry	390	132
377	Derry	13	3
378	Derry	293	143
379	Derry	476	153
380	Derry	266	99
381	Derry	14	5

Preparer's note: Pursuant to an agreement signed with NHDOT and SNHPC, the employment data are not available for public distribution.